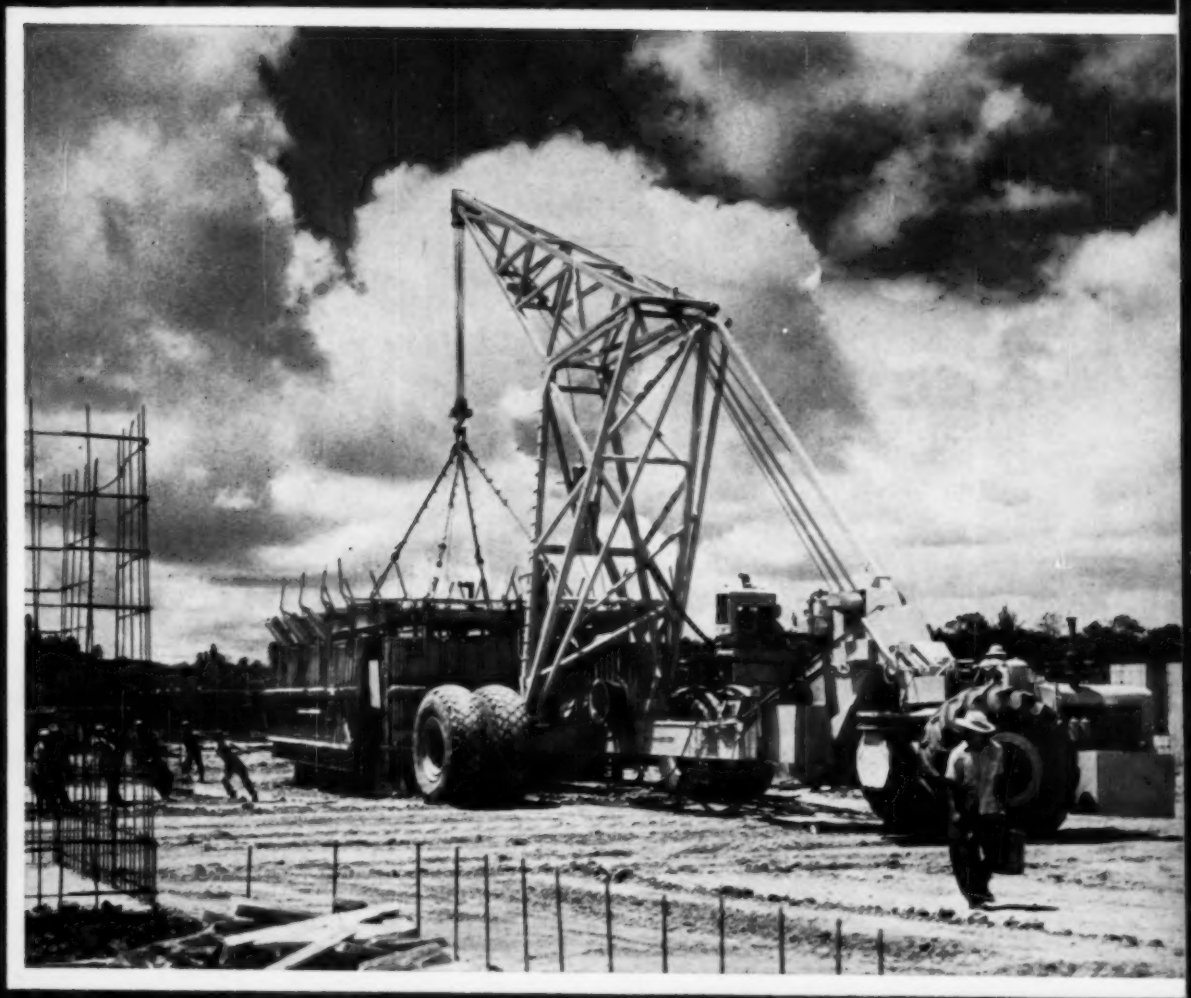
INTERNATIONAL

Management Digest

TECHNICAL • INDUSTRIAL • COMMERCIAL



Your billing peaks can be leveled, too—with a Sensimatic!

Grain firm levels billing peaks

Usines Maselis Frères of Roulers (Belgium) cuts accounting time 60%—finds answers always at hand, even during peak sales periods.

Because the use of feed and seed grains is extremely dependent on season, Usines Maselis Frères sales are heavily concentrated at certain times of the year.

Until recently the accounting staff was literally overwhelmed by the volume of work and complex detail at these peak selling periods. Yet additional help could not be justified, because less demanding periods followed. A solution had to be found, so management turned to the Burroughs man.

Result? Together they made a full study of the situation. A new system was devised, built around the versatile Burroughs Sensimatic.

Now each day at noon the exact situation is known. The balance is always ready the first of each month. The Sensimatic easily handles the sudden peaks of business. Customers' accounts are accurate, issued on time.

Can your business profit from faster facts? Your local Burroughs man offers experienced advice on modern business machine methods, complete service. For his address, write: Burroughs Corporation, Detroit 32, Michigan, U.S.A.

"Your machines pay for themselves," says Mr. Manhaeve, *(left)* office manager, to Mr. Kockenpoo, *(center)* the Burroughs man.

Call in your local Burroughs man

Prosperity Follows Good Roads

Farm-to-market, mine-to-factory, city-to-city — in fact, nearly every phase of a nation's welfare and the prosperity of its people depends upon well-maintained arteries of travel.

To keep roads in good condition, Allis-Chalmers provides a machine specifically designed for this work — the low-cost, diesel-powered Model D Motor Grader.

Available with a variety of attachments, this useful machine maintains secondary and rural roads in good condition for all-year travel; keeps shoulders of main highways smooth and safe. It is also used to build and maintain access roads to mines and logging operations, in oil fields and around industrial plants. It performs all of these operations at the lowest possible cost . . . on either private or tax-financed projects.

The Allis-Chalmers dealer in your area will gladly supply complete information on the many advantages of this versatile machine.

CONSTRUCTION MACHINERY DIVISION, DEPT. MH1155, MILWAUKEE 1, U.S.A.

MODEL D DIESEL
50 brake hp
Weight, 9,350 lb (base unit)
4 forward speeds to 25.2 mph

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50 brake hp
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4 forward speeds to 25.6 mph

ALLIS-CHALMERS

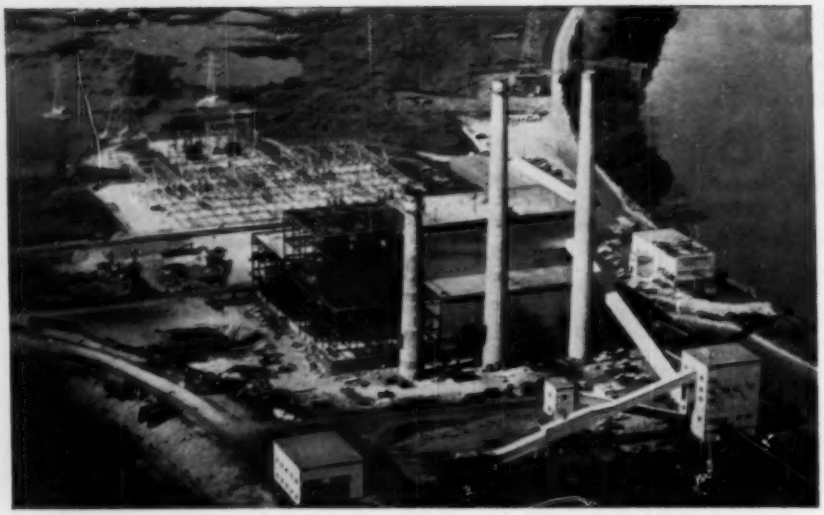
BUILDERS OF MACHINERY SINCE 1847

Shoulder Maintainer Keeps Highways Safe — Economically

The Model D brings earth shoulders of hard-surfaced roads up to grade with the rear-mounted shoulder maintainer. Shoulder material (earth, gravel, etc.) is moved to the edge of the pavement by the grader blade; the grader's tandem drive wheels pack the earth against the edge of the pavement. Then the maintainer blade distributes the material evenly . . . producing a safe, smooth, well-drained shoulder.

Windrow Eliminator for Efficient Earth Road Maintenance

Equipped with the windrow eliminator, the Model D grades a road in a single operation — eliminates the need of a second operation to remove the windrow . . . saves fuel, reduces operating time.

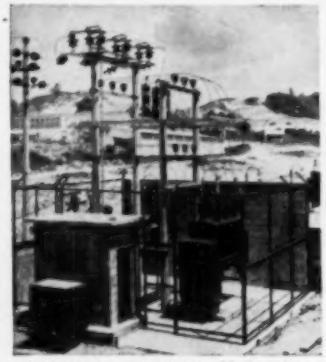


INCREASING CAPACITY—Steam-electric plants like this help public and private power companies keep pace with growing needs for low-cost electricity. Allis-Chalmers supplies these plants with turbines, surface condensers, motor-generator sets, blowers and a wide variety of pumps. A-C is also a major supplier of equipment for hydroelectric projects.

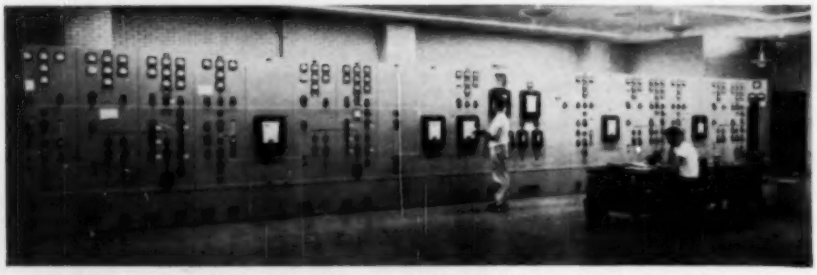
Producing and Delivering Power

for Homes and Industry!

For more than 50 years, Allis-Chalmers has been pioneering the development of equipment for more efficient generation and distribution of electricity. Here are examples of how this apparatus is used to help people all over the world produce more, have more, live better.



SIMPLIFYING DISTRIBUTION—Unit substations like these are used by many industries to bring high voltage close to the load center. All necessary components—transformers, circuit breakers, as well as switchgear for inside-the-plant power distribution—are built by Allis-Chalmers.



IMPROVING TRANSMISSION—This is the control room of a power company substation. Built by Allis-Chalmers, the panel and electrical equipment which it controls make it economically possible to transmit power over long distances and bring the benefits of electrification to previously under-developed areas.

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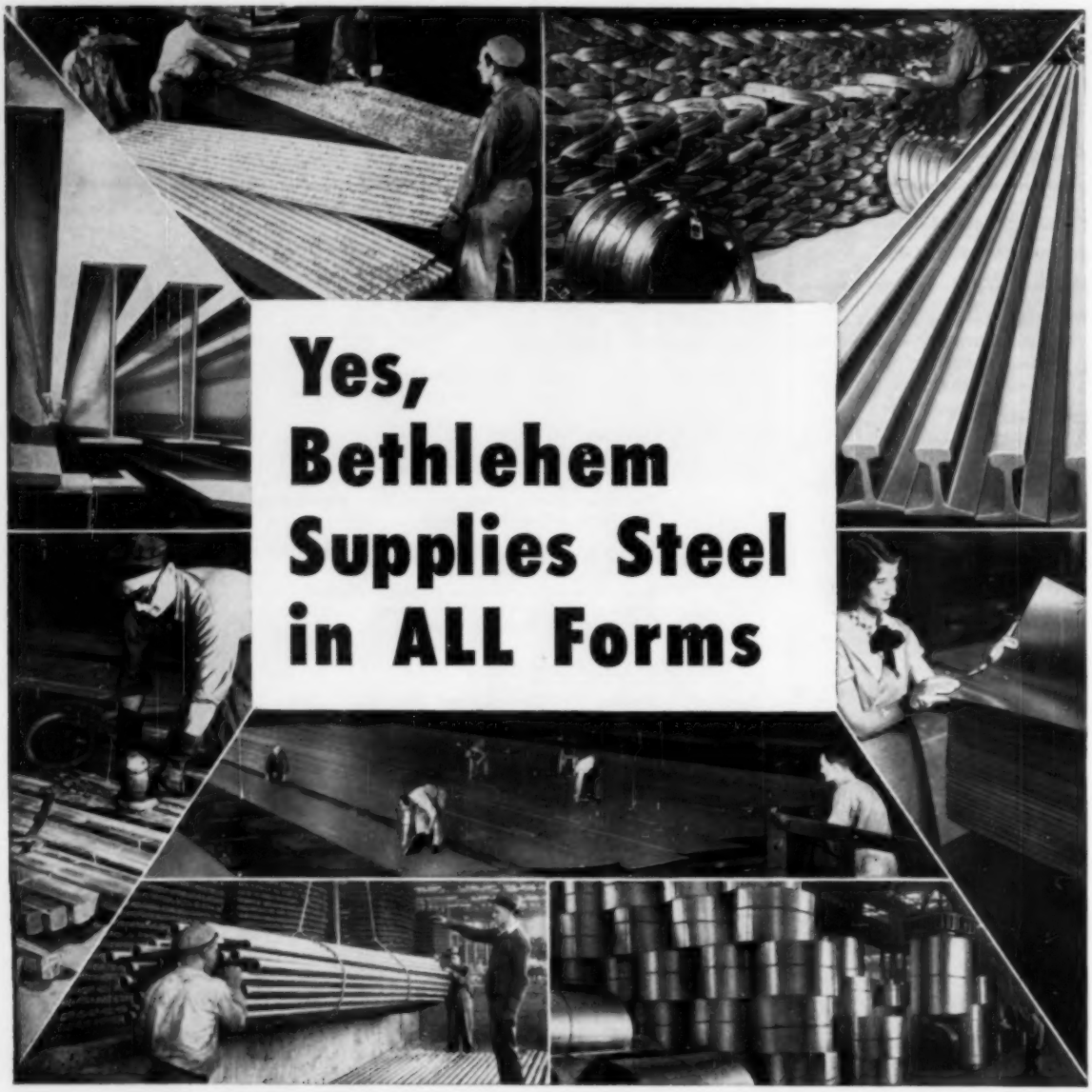

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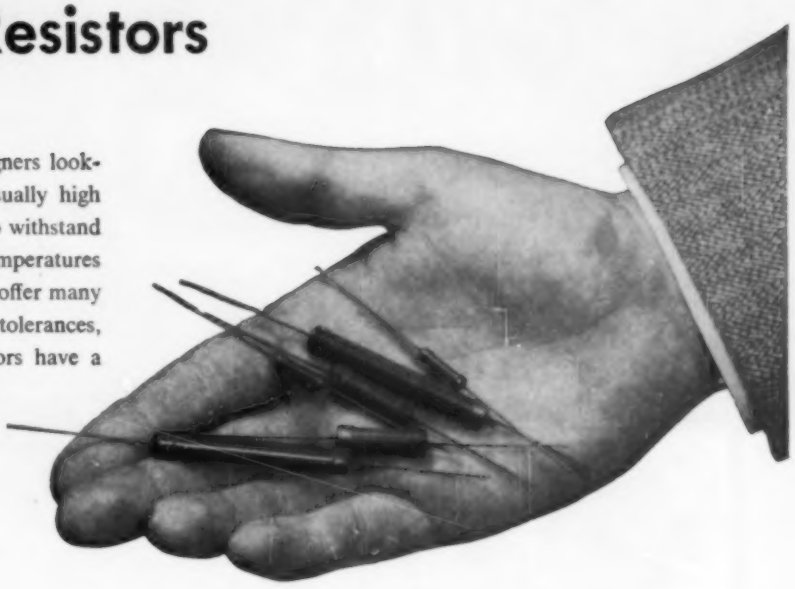

Corning Type S Resistors give you:

Excellent high temperature characteristics—These resistors will operate at ambient temperatures up to 200°C.—have an unusually low temperature coefficient of resistance.

Remarkable stability—The resistive element of Corning Type S Resistors is so stable it can be cycled from near absolute zero to red heat without impairing its electrical properties.

Superior high frequency characteristics—The thin film insures inherent stability and provides excellent high frequency characteristics.

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1 Watt	$\frac{19}{32}$"	$\frac{11}{64}$"	10	10,000
2	$\frac{15}{16}$"	$\frac{19}{64}$"	10	40,000
4	$2\frac{1}{16}$"	$\frac{19}{64}$"	20	100,000

Rugged construction—The new film material makes integral contact with the heat-resistant base to form a tough bond. Fired-in silver bands afford low resistance, low noise termination.

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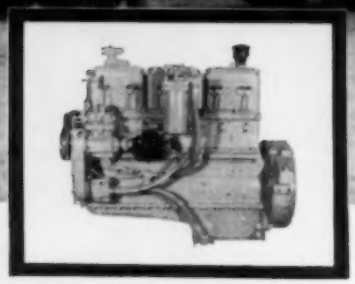
Cummins Diesel User Report



Cía de Transporte República, S.A., of Havana, Cuba, powers 14 Autocars with Cummins 165 and 150 h.p. diesels.

Cuban truck fleet lowers fuel costs... averages 325,000 miles between overhauls!

Transporte República of Havana, Cuba, operates 14 Cummins-powered Autocars like this on its general freight-service route between Havana and Santiago—a round trip of 1215 miles. Eight weekly regular runs make deliveries at 32 stops; in every ten-day period there are also 16 special-express runs that make deliveries at 15 stops.

Eight of Transporte República's Autocars are powered with Cummins 165 h.p. (HRB-600) Diesel; the remainder use Cummins 150 h.p. (HB-600). Owners Mario Candio, Nicholas Amaro, and Esteban Amaro agree on the superior efficiency of these diesel-powered trucks.

"We are completely sold on Cummins engines," they say. "Our fuel costs are down (Cummins-powered units average 5.8 to 6.1 m.p.g.); our engines operate a maximum time with minimum of attention; we use very few parts between overhauls. As far as Transporte República is concerned, there's no better engine made!"

CUMMINS DIESEL POWER CAN PAY OFF FOR YOU, TOO!

Cummins makes diesels—60 to 600 h.p.—for every power use. Actual operators' records show that Cummins Diesels actually use less fuel than other engines doing the same job—and all Cummins Diesels operate on economical No. 2 diesel fuel.

And now every Cummins features the exclusive PT fuel system that assures top performance . . . easiest possible maintenance. It's simpler to understand than gasoline carburetion and ignition or any other diesel fuel system.

Cummins world-wide distribution set-up assures you of the availability of genuine Cummins parts and service wherever you are.

Check the list at right for the Cummins distributor nearest you. Contact him for complete information.

Cummins Diesel User Report

The "ADO-Autos Pullman" Bus Line, Mexico City, powers 120 buses with the 150 h.p. Cummins Diesel (model JBS-600).

Mexican bus fleet cuts running time on rough route... doubles mileage between major overhauls!

Mexico City's "ADO-Autos Pullman" Bus Line operates 120 Fitzjohn 37-passenger coaches like this over routes that climb as high as 12,000 feet and then drop down to sea level. Schedules are between Mexico City and Vera Cruz, Oaxaca, Puebla, and other Mexican cities. The rugged mountain terrain is an important factor in each schedule.

Rafael Baston Pulido, president of the line, says, "The Cummins-powered Fitzjohn buses better the time of gasoline buses on all these rough routes. We've reduced running time to Vera Cruz by 60 minutes . . . running time to Oaxaca, by 60 minutes!

"Cummins Diesels mean less shifting on grades . . . better scheduling," continues Pulido. "In addition, the Cummins-powered Fitzjohns are more economical. Since switching from gasoline-powered engines, we've more than doubled the mileage between major overhauls."

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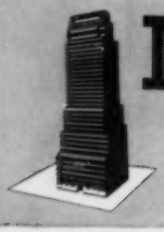

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Considering all the family's properties and expectations, this book encourages the development of personal and family investment programs through a basic understanding of procedures and a sound presentation of principles.

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This text sets forth successful operating procedures, presents new techniques and adaptations, reports pertinent research, and presents motion and time-study problems, with their effects and solutions.

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This unique text, the first of its kind, gives the future businessman a general background in the whole broad field of accounting pertinent to his interests and requirements, with emphasis on financial and management problems.

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This new text consists of helpful cases grouped according to a wide variety of business activities. The cases describe actual problems of the small-business owner-manager, and encourage the development of realistic policy-making habits.

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Containing self-analysis tests, charts, and case histories, this book is based on the idea of improving executive skills—those natural skills which are the basis for business success.

8. SMITH—Psychology of Industrial Behavior, 477 pages, 1955 . . . . . $6.75

This outstanding new treatment constitutes a review of the psychological facts and methods which will clarify and solve many of the human-relations problems of modern industry.

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▶ WORLD TRENDS

EAST-WEST . . .

Trade between the Soviet block and the West is the subject of much talk these days—and much complaining on the part of the Russians. Their chronic complaint is that the free nations persistently refuse to relax "excessive" export restrictions. The Russians, once again, have chosen to overlook two vital points:

- **Removal of controls is a two-way proposition.** Throughout the West, only a small proportion of exports are officially controlled. In the East, ALL exports are closely controlled and are weighed down by a cumbersome and inefficient state trading system.
- **Even if all controls were removed,** there would be no tremendous upsurge in East-West trade. Soviet buying power is limited. It is becoming more and more apparent that the Russians are short of marketable exports with which to pay for incoming goods. This limitation, more than controls, will shape the future trend in East-West trading.

GREAT BRITAIN . . .

The United Kingdom's declining share of world trade is the result of excessive concentration on selected markets. This is the current opinion of many experienced traders and observers—some of them interested in bettering the position of Britain, others merely trying to learn a lesson from Britain's misfortune. The United Kingdom, they believe, has lost many trading opportunities because of the tendency to settle into "established trade patterns."

The forecasters expect a change. They think that official London export policy will begin to give more encouragement to export sales outside the sterling and dollar areas—to Japan, Argentina, and Venezuela, for example. Government-negotiated trade agreements will (and should) be widely used by Britain in an attempt to broaden its trading base.

BRAZIL . . .

Brazilian businessmen are in a nervous mood. The near future poses many question marks. One is a rumored monetary exchange reform that, somehow, never materializes. Another is political uncertainty—with serious questions remaining unanswered. Still another is the fact of an increasing foreign-exchange deficit.

But in spite of local problems, the foreign investors who have invaded Brazil in great numbers show no signs of leaving. In fact, more and more manufacturers are coming in—from France, Germany, England, Sweden, and Japan. As for U. S. interests, they are currently making plans that will double their Brazilian production potential. Local conditions, apparently, are not frightening the outsiders.

UNITED STATES . . .

The business boom is due to forge ahead into '56. This is the story told by the nation's best business indicators. Capital spending by business and new orders for machinery, for example, are setting records.

The movement, in nearly all areas, is upward. Inflationary pressures exist, but will be compensated and controlled. President Eisenhower's illness will have no serious effect on expansion.

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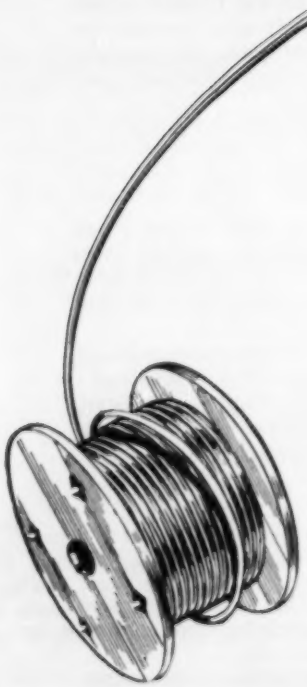

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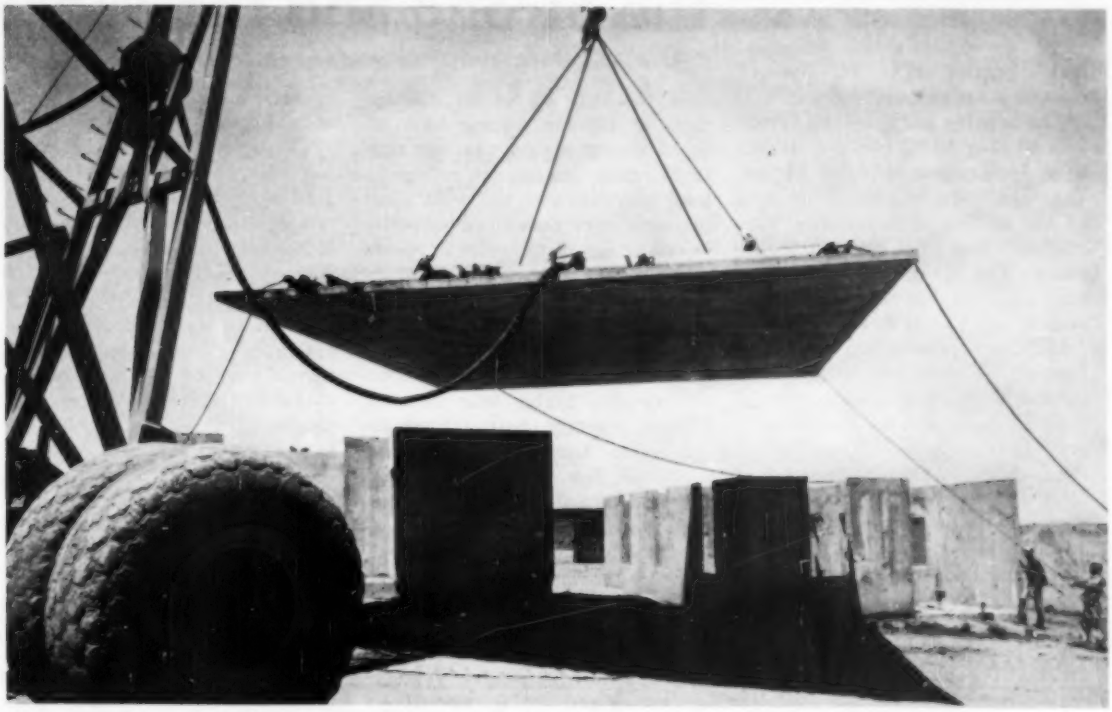


Precast roof goes into Puerto Rican housing . . . a small part of the Rockefeller plan for . . .

Latin American Development

Digested from BUSINESS WEEK, Sept 10, p94

The family with the fabulous oil fortune—the Rockefellers, who decided that their money should be used for humanitarian as well as commercial purposes — now has three major projects under way in Puerto Rico: a resort hotel, a supermarket, and a housing project. All three are motivated by a double purpose: first, to promote the economic development of Puerto Rico, and second, to make a reasonable profit.

The Rockefellers do not expect to get richer from their new Puerto Rican projects—nor from numerous other ventures which they are currently pursuing in Latin America. But they regard profits as necessary for two reasons: one, to justify the operations as commercial "pace-setters" that would serve to lead other business interests into the Latin American field; and two, to help finance other Rockefeller projects in Central and South America that are operating at a loss.

The hotel, to be built in the countryside near San Juan, is being sponsored by Laurance Rockefeller, personally. Initial investment will be $2-million. Half of that sum will be loaned by the Puerto Rican government, with the right to purchase shares of stock. The remainder is to be furnished by Rockefeller. The hotel will be aimed at middle-income tourist trade.

The supermarket is being financed by the International Basic Economy Corp., a private organization sponsored by the Rockefeller brothers. IBEC started after World War II with a fund of $12.5-million and grandiose ideas for lifting the economies of "under-developed" countries.

Some of IBEC's projects have succeeded; many have failed. The loss in 10 years has been between $7- and $10-million. However, IBEC is still in business — and wiser. "Now we look a lot more closely at the economics," says one official. "If we lose money, neither local nor outside capital would, or could, follow our lead."

IBEC already has had some success in operating supermarkets in Latin America, especially in Venezuela. The Rockefeller group claims that its activities in Maracaibo, for example, have produced active competition among grocery companies with the result that food prices there have declined between 15 and 20%. IBEC hopes to do as well, or better, in Puerto Rico. Buying in bulk quantities is one major cost-cutting practice that should allow IBEC stores to sell at lower prices.

The first store will open in leased

quarters in a proposed shopping center in San Juan. Branch stores will follow later. IBEC is investing $200,000 initially. If the project is a success, local investors will be invited to participate. Eventual local participation is one of IBEC's standard objectives.

The housing project—Las Lomas—is another IBEC venture. It will be a development of 1,625 houses. They are being finished at the rate of six a day. A modern, super-efficiency has been brought to the scene. The result is speed, economy, and much more house for the money.

IBEC's economical construction method involves dropping steel forms—a single unit that includes both exterior and interior walls—over a lattice work of reinforcing steel, and filling them with concrete. Next day, the forms are lifted off, a precast concrete slab roof is laid on top (see picture), and the basic house is complete. A three-bedroom house sells for $6,000.

The Rockefellers' IBEC is really more interested in promoting a method of construction than it is in selling houses. It believes that its low-cost building technique eventually can be extended far beyond Puerto Rico — and that some day soon it will ease the strain of a chronic housing shortage throughout all Latin America. As with all its projects, IBEC is attempting to set a profitable example for both local and overseas businessmen.

New

American investors will continue to purchase foreign securities in ever-greater quantities. Well-established firms abroad that are seeking dollar funds should try to promote the sale of their securities in the U. S.

New Securities Exchange Commission (SEC) regulations provide a form for registration of depository receipts—issued to purchasers of foreign securities in the U. S.—in order to simplify trading. Foreign concerns must provide detailed information to the SEC, Washington 25, D. C. (see Financial Digest).

Digested from AMERICAN LETTER, Sept 17

Commodities in Europe . . . the Strong and the Weak

Digested from THE ECONOMIST (London), Sept 3, p785

In the past 12 months, the nations of Western Europe have enjoyed abundance for the first time in 15 years. Motor cars, refrigerators, television sets, and many other products have poured off assembly lines and out of factories in record quantities. The purses of the public have never been so full.

Industrial production in Western Europe has risen by 20% in the last 2½ years, reaching in mid-1955 a level 40% higher than in 1950.

Until recently, this upsurge in production and consumption had produced few strains upon resources, except upon manpower. Now, however, strains are appearing—strains that are clearly evidenced by world commodity prices.

Prices indicate a double trend. The products of agriculture—cotton, wool, jute, cocoa, coffee, sugar, oils, fats—are in relatively ample supply and are selling at relatively weak prices. Conversely, the basic products of industry—coal, oil, steel, tin, copper, lead, zinc—are in relatively short supply and are selling at relatively strong prices. The only major exception to this double trend is rubber. It is selling at fairly high prices—even though a product of the soil.

Main reason for this double-price trend can be expressed in a single word: capital. It is simply much cheaper and quicker to cultivate more land, or to cultivate land more intensively, than to bring to the surface another 100,000 tons of, say, copper ore. Plenty of bread is easier to achieve than plenty of steel. And even the effects of bad harvests are now cushioned by huge stocks of certain crop commodities that are available in the U. S.

Coal and Steel—Neither Britain nor Germany, the two biggest European producers, have been able to raise capacity enough to keep pace with demand. Both have been obliged to spend millions of dollars for importing coal and steel from the U. S. Both are depending on imports of semifinished and finished American steel to cover home demand as well as overseas demand.

Germany, in the past few months, has begun to import more finished steel than it exports, but Britain is still exporting twice as much as it imports. Export prices have been rising since the beginning of 1955. Domestic prices have tended to remain more stable.

Copper — Abundance can be turned into scarcity by misfortune—that is the story of copper. World production this year, barring labor troubles, was expected to be well over 300,000 tons more than last year—quite close to the rate of consumption. However, about 100,000 tons has been lost by labor-union strikes in Rhodesia and the U. S. Recently the price of copper in London reached £400 a ton, a rise of 70% in the past year!

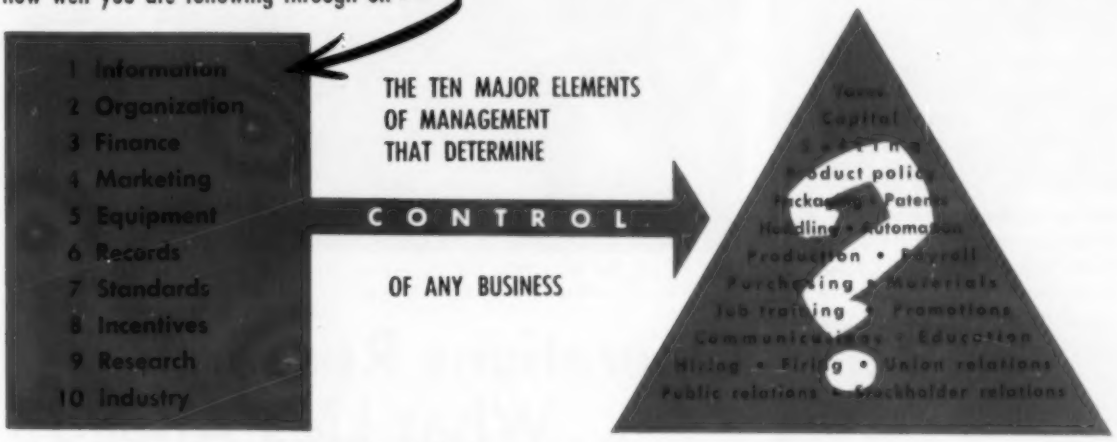
Aluminum—World-wide demand for aluminum has recently grown faster than even the most optimistic producer could have forecast. Existing facilities are being expanded, especially in British Columbia (Canada), but not fast enough. Supplies to many consumers are rationed, and producers of aluminum in Austria and Japan are getting "premium prices" in Western Europe.

Nickel—Supplies have never been adequate in recent years, despite a steady expansion of world production. "Free" supplies are commanding prices more than twice as high as International Nickel's price of £521 a ton, delivered on the Continent.

The relative shortage of industrial as opposed to agricultural commodities may remain a problem for a considerable time. Any ease in the shortage of industrial commodities will depend much more on the chance of lowering demand than on the chance of expanding production quickly. Anti-inflation measures in Britain and other countries are now working toward a lower demand on the homefront.

▶ MANAGEMENT

Are business problems pyramiding faster than you can handle them with ease? If so, better doublecheck to see how well you are following through on



You may find that year-end is a good time to . . .

Audit Your Business Methods

Digested from SALES MANAGEMENT, Aug 15, p42

Business problems, for many companies, are multiplying and growing like magic these days, largely because of industrial and commercial expansion. Since World War II, nearly everywhere there has been an amazing growth of business firms—in terms of both number and size.

One negative result of rapid expansion is that many businessmen, under pressure, tend to overlook some of the vital management controls—controls important to the profit result of any substantial organization. What suited the 20-man shoemaker shop in 1937 was probably not at all suitable for the 100-man shoe factory 15 years later. And the business practice that was adequate in 1952—and this is no exaggeration in many cases—could mean bankruptcy by the end of 1955!

What better time, then, than year's end to take an inventory of current management practices? The procedure could prove to be a lot more important than the usual inventory of "goods on the shelf." To get a broad picture—prior to a more detailed analysis—review the following points of control carefully. Checklist your operation. Under each major item are listed the more **important characteristics of superior management:**

Information—(1) Daily, weekly and monthly reports are directed upward toward top management, from all major divisions of the business. Labor performance reports are included. (2) Budgetary control over all expenditures is maintained. (3) Future trends are developed by research reports.

Organization — (1) The organizational setup is clear and well-defined with fixed responsibility, no overlapping authority, and complete coordination between all departments. (2) Centralized personnel management is practiced. (3) A detailed organization chart covers both personnel and functions. (4) "Promotion from within" is the general rule. (5) Training programs get ample attention. (6) Services of consultants are used in special situations.

Finance—(1) Liquid (quickly available) funds are maintained through adequate liquid investments. (2) Funds are kept available for making advantageous purchases, over and above usual outlays. (3) Current ratios are controlled by use of budgets. (4) Financial provision is made for replacing depleted and depreciated assets. (5) Excess and idle plant capacity is carefully measured. (6) Inventories are carefully controlled.

Marketing—(1) A complete market analysis is conducted periodically. It shows both actual and potential sales for each sales territory. (2) Sales efforts are frequently analyzed. They are then controlled and directed to obtain a maximum result from the effort expanded. (3) Sales are analyzed also on the basis of profits realized, as between products, and various sales territories. (4) Customer service is treated as an important function.

Equipment—(1) Modern machinery is used wherever possible. (2) Equipment layout takes full advantage of the "synchronized progressive line" in any situation where people and machines are

grouped to perform repetitive operations. (3) All production is recorded and accounted for on a time basis. (4) Adequate maintenance keeps equipment in excellent condition. (5) Repair costs are carefully recorded, and repair standards are set.

Records—(1) All unnecessary records are eliminated. (2) Records (and reports) are simple and clear; they meet the specific needs of those who use them. (3) Modern mechanical bookkeeping and statistical methods are used where practical. (4) Records (and timely reports) cover performance of products in the laboratory and test departments, and in the field where practical. (5) The accounting system and cost system are organized to fit in with the overall organization of the company, department by department. (6) Adequate filing is treated as important; a system is followed.

Standards—(1) Standard costs are developed. (2) Overhead costs are controlled by means of a flexible budget; department heads are made responsible. (3) Quality standards are established. (4) Methods and production standards are well defined and enforced. (5) Standards guide all production planning.

Incentives—(1) Direct labor is given a sound, fair incentive plan in relation to production quotas. (2) Direct labor incentive payments are controlled by performance standards. (3) Sales incentives are provided for sales efforts and results. (4) Top executives are given a special incentive compensation plan. (5) Special incentives are established for supervisors and key men.

Research—Constant, planned research covers: (1) sales methods, (2) management methods, (3) production methods, (4) product design, (5) possibility of new products.

Industry—Company participation in industry activities is regarded as vital to the business: (1) The company takes active part in projects of the industry's "trade association." (2) The company helps to establish and maintain fair-trade practices—on an industry-wide basis.

LOS ANGELES MEETING of Operations Research Society brought out 500 delegates, all enthused and eager to find the answer to . . .

Operations Research: What Lies Ahead?

Digested from BUSINESS WEEK, Aug 27, p64

Back in the old days when the scientific approach to management was still in the test-tube stage—7 long years ago—the Operations Research Society of America was organized. The idea was to form a responsible group that would plot a safe and sensible course for the advance of scientific management practices. Since then, ORSA has held annual conventions, with delegates attending from all parts of the country.

The recent meeting in Los Angeles was not only well attended and productive of many new ideas—it was highly optimistic, too. The bold decision of the convention was that Operations Research has finally come of age, that NOW is the time for management to put more of its decision-making on a scientific basis!

"Scientific basis" covers a multitude of tools: higher statistical and mathematical theories, linear programming, input-output, quadratic equations, the theory of games, decision theory, symbolic logic, probability, search theory, etc. The operations researcher uses these to build a hypothesis, or model, of the results of following a given policy. (See McG-H Digest, Aug, p11).

Three main points emerged from the Los Angeles conference:

- After years of experimenting, Operations Research is at last a well organized body of information. Now it is ready to fulfill its promise to perform big jobs for business.
- Management itself is becoming scientific. Even some of the more conservative industries are turning to Operations Research.

Operations Research has gone past the stage of merely clarifying facts. It is now capable of recommending positive courses of action.

The big question that is currently causing a split of opinion among ORSA members is whether Operations Research—in line with the last point above—should be allowed to invade the area of actual decision making. George L. Parkhurst, vice-president of Standard Oil of California and keynote speaker at the ORSA meeting, expressed the view that Operations Research men should be limited to fact finding. The question was left unsettled.

"In any case," said Mr. Parkhurst, "the really big long-range question confronting both management and Operations Research men is: How can business reorganize its operations to meet the challenge of a vast and ever-expanding worldwide economy?"

What To Do . . .

When You Have Your Picture Taken

Digested from AMERICAN BUSINESS, July, p24

Executives the world over, like motion picture stars, must have their pictures taken. From San Francisco to Santiago, from Cardiff to Cairo, businessmen are facing cameras. Directors' meetings, company dinners, dedications, school graduations, civic charity meetings, conventions, trade fairs—all these are occasions for the executive to straighten his tie and make an impression on film.

The only trouble is, the impression is not too good in many cases. The business executive—on the average an interesting and friendly person—is frequently made to look severe and sour, or just plain dull.

Picture planning is necessary. When the time comes to have pictures taken for a newspaper or posters or for company purposes, the filming session should be well planned. Not only should the pictures give a good likeness of the subject, they should give a good indication of his personality, too. Since businessmen are usually very active persons, pictures showing action are usually most effective. At the very last, the executive should be shown in some sort of motion—if only reaching for a telephone or a pen.

If the man is one who has risen through the ranks to achieve executive status after years of effort, the picture might well show a factory or office scene—with the executive talking to a worker on the job. This type of photo is effective for many uses, but only if the executive can manage to look comfortable and fully "at ease" in the surroundings.

Hobbies of executives can be used to good advantage. A great many businessmen spend their leisure hours gardening, woodworking, hunting, fishing, hiking, boating, sketching, and so on. Why not bring these activities into their pictures? Informal scenes away from the office are excellent for the so-called "personality story."

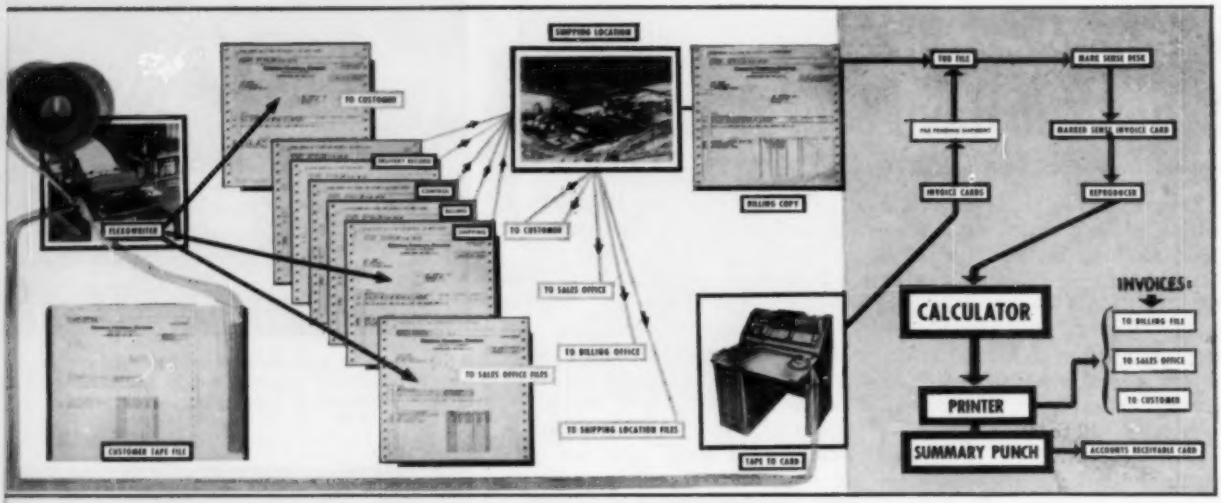
If the picture is intended to publicize the company as well as the executive—especially when the attempt is to impress employees or stockholders favorably—the picture should tell a story of new construction, research, or business expansion.

BAD—Here is a traditional executive picture—about as inspiring and as full of human interest as a passport photo.

GOOD—In this scene the executive lives and breathes and moves. He is less severe, less frigid, more forceful.

GOOD—Sleeves rolled up, tie tucked in, this executive displays factory "know-how." With coat on and dignified poses, he would have been a mere bystander.

GOOD—The picture tells the story of an active executive who is "on the firing line"—taking care of an expanding business. Employees and stockholders will be impressed.



For More Sales: "Integrated Data Processing"

Digested from CHEMICAL WEEK, Sept 3, p44

Integrated data processing (IDP) —the mechanical method that utilizes punched-hole tapes and data cards to handle large paper-work operations—has an important future in the chemical industry, and in other industries as well. IDP is used by chemical companies to process purchase orders, sales slips, customer orders, and the like. The method can be applied to many highly complex office operations where vast numbers of paper forms must be processed quickly.

The technique has been adopted recently by several large concerns in the chemical industry—Olin Mathieson, Du Pont, Dow, and General Chemical. Americal Cyanamid is considering the idea. Most recent advance in IDP has been carried out by General Chemical: a "decentralized" control system, applied to sales-order processing. To illustrate IDP, here is a brief review of General's new system:

• Repetitive information on each product sold regularly is recorded—using a "common-language" typewriter (Flexowriter)—by punchholing a paper "customer" tape. The same machine can then type future orders from the customer tape, variable data being added manually. Orders are prepared in eight copies; disposal of the copies follows the pattern indicated in the illustration above. (A bill of lading copy — not shown — is sent to the shipping location.) About 25 sales offices will have "customer" tapes.

• While the common-language typewriters write the order, a new tape, with the variable data, is punched. This sales tape contains all orders obtained by the office in one day. Sent to the billing office, the tape's data are converted to punched-hole invoice cards complete with verbal data description. The cards are then filed to await shipping data.

• The shipping location fills the order, adds car numbers, weights, etc. to its copies, and distributes them as indicated. The billing office uses its copy to add shipping data to the invoice cards by means of "mark-sensing" — pencil marks in numbered places.

• The tabulating section converts the pencil markings to punches. Next, the invoice cards are put through the calculator, are punchholed to indicate customer charges, and move on to the tabulating printer. The printer puts out a five-copy continuous-form invoice with a printed grand total. At the same time, a "summary punch" perforates one accounts-receivable card for each invoice.

• Invoice cards are then free for sales and cost analysis, and for operations research. The accounts-receivable department applies controls (makes comparisons), disposes of the invoice copies, and makes a customer ledger from the accounts-receivable card. Customer statements and remittance vouchers are easily made up from the ledger and card.

Advantages in several forms are expected by General Chemical—and, generally, are those sought by most concerns that apply IDP: (1) faster processing of paperwork in the office and billing to customers; (2) reduced difficulty and cost in attaining greater accuracy; (3) increased savings from the switch of technologically displaced workers to other jobs; (4) more interest earned on money owed to the firm—because faster billing produces faster payment; (5) less ill effect of absenteeism among office workers; (6) easy automatic production of business data and statistics — thus making operations research, sales analysis, and cost analysis more efficient and productive.

Controlling Cost of Power

. . . is important these days. Plants are using more power, and the item is big enough for cost control

Digested from FACTORY MANAGEMENT & MAINTENANCE, Sept, p111

Electric power is a big cost item in today's modern plant. Even so, few companies bother to analyze their monthly power bills —in spite of the fact that checking and analyzing are more needed than ever because of expanding business and increased power usage.

Cost control—or, at least, cost supervision—could save money in many cases.

Five major cost items appear on the usual utility invoice:

- Demand charge—based on the peak demand during a stated period, usually the billing month. The rate schedule specifies the length of time the peak must last to become standard for the month.
- Energy charge—based on electric energy used during the billing month, measured in kilowatt-hours.
- Power factor—an added charge for failure to keep the plant's power factor above a particular level specified in the power contract.
- Fuel surcharge—included in many bills to allow for the rise and fall in the price of fuel used by the utility. With a fuel-price adjustment clause in its industrial-user contracts, the utility company does not have to file new legal rates with the public utility commission, or other government authoritity, each time the cost of fuel changes. (Of course, where water power is the source of electricity, there is no fuel surcharge clause in the power contracts).
- Taxes—varying widely from one place to another, will appear as a separate item.

Twelve points should be followed through by whoever is assigned the task of supervising the monthly electric bill:

1. Be sure the meterman reads the demand meter correctly and records the proper figure. A small error in this reading can produce a big error on the final bill.
2. Make certain that the demand meter resets to zero after the time cycle. Failure to reset is a frequent weakness of the reset mechanism. When this happens, the demand charge can mount up to double what it should be
3. Consult the utility to be sure your company is taking advantage of the least expensive rate available—considering power use, etc. Study the rate structure.
4. Check power bills for arithmetical and computing errors.
5. Make a close check whenever the invoice covers only part of a month—because a new meter is installed, etc. Calculate the bill to verify part-month charges.
6. Make sure the correct constant is applied to meter readings.
7. Keep a month-to-month record of fuel surcharges; verify with the utility if changes are great.
8. Guard against incorrect tax computations. Check the local tax rates; give special attention to exemption rules.
9. Check invoices for months of high consumption to take full advantage of quantity discounts.
10. Watch the power factor—with relation to your operation. Consult the utility to discuss how to avoid a penalty.
11. Read your power contract carefully; obtain an explanation from the utility covering any unfamiliar clause.
12. Finally, keep close watch on meters and demand devices. See that equipment is inspected and adjusted periodically.

Best procedure for management is to select some person on the staff who understands the company's power setup and who has, at least, a fair knowledge of power-rate schedules. Assign the responsibility. Some concerns have even found it profitable to turn the project over to an outside specialist—the money-saving can be that significant.

Quote of the Month

HENRY FORD II

President, Ford Motor Co.

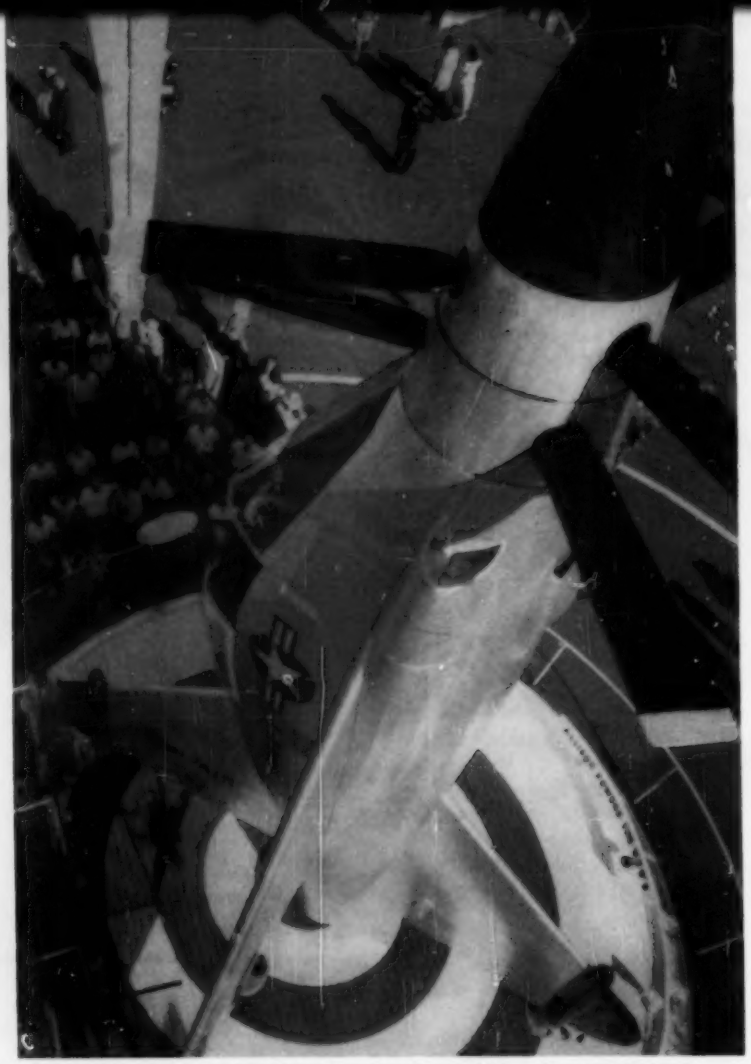
"The term 'automation' is nothing more than a handy means of describing something industry has been doing for years —improving the methods of production. Automation . . . leads to greater productivity with eventual reduction in unit costs, despite the initial heavy investment required. The worker benefits, the customer benefits, and the economy benefits because more goods are placed in the reach of more people at prices they can afford."

New

Color coding can be effectively employed by management as a training device. A series of tests completed recently by the color research laboratory of the Pittsburgh Plate Glass Co. shows that use of vivid colors to mark complex machinery can greatly aid in the training of technicians and workers.

Color coding reduced by 35% the time for learning a complex operation involving aircraft control knobs. In the experiment, trainees had to make rapid selection of eight control knobs, each about 2 inches in diameter and 6 inches apart—but varying somewhat in shape. One set of knobs was painted in vivid colors. Another set of knobs was all black. Both men and women trainees learned the proper selection much more rapidly when aided by the color codes.

Digested from FACTORY MANAGEMENT & MAINTENANCE, Sept, p125



POWER for vertical take-off craft comes from Allison Div. turbojet.

GENERAL MOTORS CORP.

At Chicago, General Motors covered 20 acres with its products. The show's emphasis: power . . . and the part that power from GM plays in industry.

DUMP TRUCK (Euclid Div.) becomes a swimming pool.

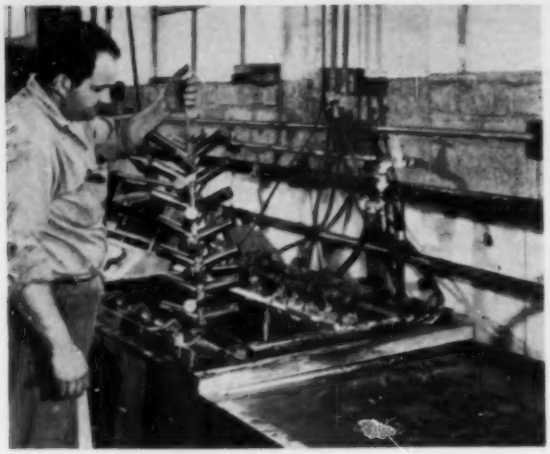
DIESEL (Electromotive) attracted would-be trainmen.

opened its doors night and day. To the public, the Powerama showed that GM meant more than automobiles.

We Go to GM's "Powerama" . . . And Meet the Power of Industry

TRACTOR (Euclid Div.) hauled GM's big earthmovers.

ENGINE'S INNARDS (Detroit Diesel) got close scrutiny.



Tin-nickel alloy plates from still tank

Small parts are plated in Lucite barrel

Alloy Plating Improves Product Finish

Digested from PRODUCT ENGINEERING, Sept, p136

New and interesting combinations of properties and appearance for product finishing stem from recent developments in the plating of alloys, rather than pure metals. So let's look at what electro-deposited alloys can offer the manufacturer of metal products.

The big advantages are good appearance, economy, abrasion resistance, and corrosion resistance. Brass and gold-alloy coatings, for example, give variable color effects, while nickel-cobalt and nickel-tin give bright deposits. Over-all, the most important advantage of alloy plating is that it provides combinations of properties that cannot be obtained with a single metal.

Brass—Long one of the most popular of plating alloys, brass provides good decorative and protective finish for iron and steel products. The plating solution consists of copper cyanide, zinc cyanide, sodium cyanide, and usually sodium carbonate. It is operated at low current density and results in a uniform color. Ammonia and other materials can be added to regulate the color of deposits. Arsenic, for example, lightens the color.

Speculum Metal—This silvery-white alloy of copper and tin is used for polished reflectors. Its hardness and corrosion resistance suit it to many other applications. Typical solution is tin, copper, free-sodium cyanide, and caustic soda.

Lead-Tin Alloys—Their use is becoming common. A recent one is as a bearing metal, with 93% lead and 7% tin. Typical fluoborate plating solution is made up of fluoborate acid, boric acid, fluoborates of lead and tin, and additives such as glue.

Lead-Silver Alloys—Adding 4% of lead hardens silver and widens its industrial uses. As the alloy is hard, deposits may be thin and not too expensive. Electrodeposited lead-silver alloys may be adapted to use as bearings by softening with suitable heat treatment.

Nickel-Cobalt Alloys—Cobalt (1 to 20%) is deposited with nickel to produce bright nickel deposits.

Aluminum Alloys—Development work is underway. The outlook for commercial use is promising.

Tin-Nickel-Alloys—These metals are capable of simultaneous deposition in the form of an intermetallic compound of 65% tin and 35% nickel. The plating solution consists of nickel chloride, stannous chloride, and ammonia bifluoride. The plate is hard and resistant to tarnish and corrosion.

White Brass — High-zinc alloy with 20% copper can substitute for nickel plate. It has good corrosion resistance.

Tin-Zinc Alloys — Principal advantages are excellent solderability and the retention of this property after aging. Biggest user is the electronics industry. The plating solution contains potassium stannate, zinc cyanide, potassium cyanide, and potassium hydroxide.

Tungsten Alloys — These alloys are being studied because of their good chemical and physical properties at high temperatures.

Copper-Tin Alloys—Bronze is the most promising corrosion-resistant undercoating for nickel-chromium plating. Its substitution for copper increases corrosion resistance, hardness, deposition rates, and coverage in recessed areas. Other uses: finishing parts without the use of nickel and as a decorative finish closely resembling 24-karat gold. Bronze can be plated fully bright or dull, as desired. It can be deposited directly on zinc die castings without prior flash plating, and, on aluminum, it can replace copper over the immersion zinc coating. Plating is done from a bath of potassium cyanide, copper cyanide, potassium hydroxide, potassium stannate, and Rochelle salts.

Let These Ideas Guide You When

Buying Capital Equipment

Digested from CHEMICAL WEEK, Sept 17 (Part Two), p721

When you buy capital equipment (no matter whether it be a pill maker or pump, a motor or machine tool), it's a lot like choosing a wife: Make a bad selection and you may spend years regretting it. In short, it's a task not to be approached lightly or without plenty of information.

There is no one answer to the problems created by a new installation or a piece of new machinery. It may upset the working capital position of your company, even its whole capital structure if the addition is a major one. It may change your cost structure, make labor skills obsolete, do the same thing to management know-how.

But once you decide to buy the equipment, you can set up a procedure to deal with procurement problems in a sensible, orderly manner. These seven guide points will help you:

1. Specification. After the decision has been made to buy, write the specification. It can be simple, as for a pump, or complex, as for a piece of distillation equipment. But whether simple or complex, it should clearly tell the supplier what you want.

If an "equipment" specification (what it is) cannot be drawn exactly, you may go to a "performance" specification (what it should do). This shifts responsibility to the seller, but be sure to include a description of the tests the product will have to pass. Give plenty of information on the tests.

2. Bidders' List. Complexity of the equipment dictates the size of the bidders' list. Get information on their delivery dates, credit terms, guarantee of adjustments, and cooperation in pre-sales and post-sales technical aid and information. Then set before each supplier an invitation to bid; expect prompt but not hasty action on his part.

If the item is complex and you think the bidders should see the plant, you may want to consider the advantage of holding a bidders' meeting at the site.

3. Choosing Vendor. This is a crucial step. Yet if you have drawn up a good specification and bidder's list, you should have no particular trouble in selecting the supplier.

Firm bidding may not be your soundest step. If a performance specification was drawn up, an analysis of the bids is actually an analysis of the production costs of the equipment. Revisions at this time may bring about economies—in the amount invested or in operating and maintenance savings.

4. Awarding Contract. After you pick your vendor, award the contract. The usual purchase order may be sufficient. But you may want to insert special clauses for added protection—the so-called patent clause, for one. And you may want clauses spelling out liability of both parties with respect to taxes on the equipment, extra charges, adjustments, inspection rights.

5. Expediting. Follow-up is important as plant-layout changes are often synchronized with equipment delivery. A popular way to keep operations in step is to list all the items needed, along with their delivery dates. Then keep it up to date. You may be able to expedite equipment by telephone calls, but often a visit to a supplier's plant helps deliver the equipment quicker.

6. Acceptance and Payment. These are routine. The acceptance stage shows how well your preliminary planning, including specification writing was done.

7. Records. Do not neglect the important task of keeping adequate records. They smooth the actual purchasing job, verify past actions, help in future purchases of similar equipment. These records should include vendor files, quotation files, price records, purchase-order files, and special records on care and maintenance of the equipment.

In Using Materials . . .

. . . is the old way the best? Better utilization will cut both material and labor costs

Digested from METALWORKING PRODUCTION, Sept 2, p1581

Better product design and improved manufacturing methods can reduce appreciably the total amount of material and man-hours needed to make most products.

These conclusions were reached by the British Institution of Production Engineers when it investigated a wide range of machined parts. It found that the material-utilization factor (the proportion of material purchased that is converted into saleable goods) is seldom greater than 70% and frequently less than 30%.

The following table indicates the wide variation found:

Type of Material	Utilization %
Bar parts	12–80
Sheet metal	66–98
Brass sections	65–90
Iron castings	53–93
Aluminum-alloy castings	67–93
Steel stampings	46–86

The report cited these actual examples of better material utilization:

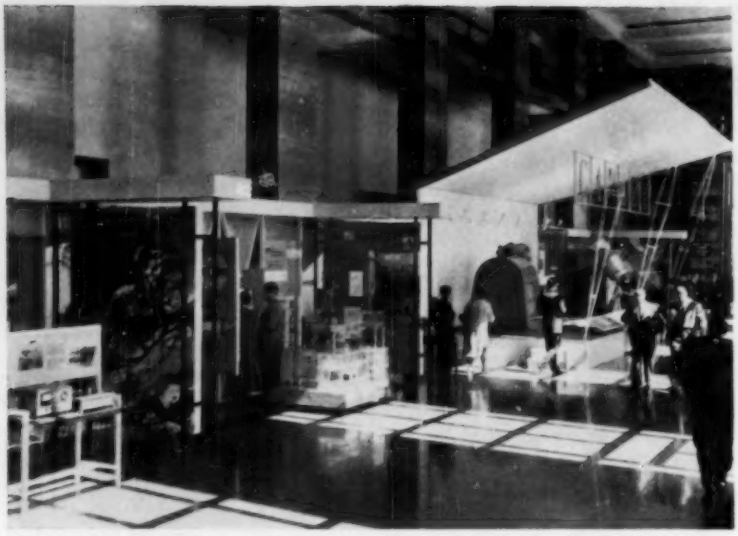
Guide bushing in Monel was changed from machining from a solid piece of stock to a copper-brazed assembly. The material used was cut from 6½ pounds to 2 pounds 5 ounces.

Gear-box selector, formerly made as a forging, is now produced from a pressing and shaft that are welded together. The material cost saving was 55%, labor 35%.

Brass bevel gear, once machined from solid stock, is now hot-pressed. Material utilization increased from 28% to 90%.

Adding-machine pawl was machined from stainless-steel solid stock. Casting by lost-wax process improved utilization from 11½% to virtually 100% and cut the final cost to one-third the original cost.

In all these examples better labor use and resulting lower labor costs were observed.



CANADIAN EXHIBIT at Geneva featured two medical therapy units, later sold to Geneva and Marie Curie Foundation. This is just one isotope use.

Radioisotopes Gain New Users

Digested from NUCLEONICS, Sept, p78

Radioisotopes offer the most immediate benefit from atomic-energy developments. In U.S. industry alone, the total savings from all isotope applications are estimated at $100-million a year. Savings are expected to grow ten-fold within 10 years.

From the Geneva International Conference on Peaceful Uses of Atomic Energy (MD, Oct, p12) comes new information on the application of isotopes in various countries. Principal uses have been in tracing, gaging, and medical research and treatment.

• **Tracer Techniques** — Among the applications described was the detection of leaks in buried pipes up to 5 kilometers long. Three methods were developed in England for pipes of different lengths. Shorter pipes were filled entirely with the isotope (sodium-24) solution, while longer pipes were checked by tracing-solution flow as shown by Geiger detector.

Automobile-tire wear has been measured in the U.S. with isotopes. Treads were tagged with a radioactive plasticizer. Measuring the radioactivity of the rubber adhering to the road surface has demonstrated that life expectancy at 60 miles per hour is only 57% of that at 30 miles per hour. Formerly, tires had to be run at least 5,000 miles before wear became measurable.

Russian use of isotopes in ferrous metallurgy has been extensive: mechanics of desulfurization; calcium and sodium transfer in slag melts; admixture separation during steel solidification; movement of charge and gases in blast furnaces; melting of alloys added to open-hearth furnaces; even directing strips through operations according to grade by tagging each strip differently.

The Russians also have developed a method to test the wear on three parts at one time. Isotopes of different energy are needed. By either filtering out the beta rays or using various absorbers, counting of each isotope may be done. This gives the wear on each part.

• **Radioisotope Gaging**—As beta, gamma and neutron radiation are all useful, isotope gaging is versatile indeed. In the U.S., for example, beta thickness gages have proved highly valuable in automatic machine control. They have given these reduced product variations: paper machine, 12% (before) to 3%; tandem cold-roll metal mill, 10 to 1½%; rubber-sheeting calendar, 10 to 3.2%; rubber-tire-fabric calendar, 6.5 to 3.5%; plastics calendar, 7 to 2.5%.

Gamma-ray gages are as versatile. Gamma transmission gages can distinguish petroleum fuels of only 0.3% difference in density. Backscattering of gamma rays has been applied in England to a gage to measure steel thickness up to 2 centimeters within 4%; the instrument uses nearly 180-degree scattering angle. Its cobalt-60 source is mounted 2.5 centimeters from a sodium iodide scintillator.

Other materials that may be gaged by gamma radiation include bagasse and raw sugar for weight, snow packs for water content, and petroleum for sulfur content.

Among neutron radiation uses is soil-moisture metering. Measuring moisture in grain, timber, and stone with portable battery-operated gages is under study in the U.S. and England.

• **Medical Applications** — Major medical uses of radioisotopes have been in research. Metabolic studies, for example, have profoundly altered some concepts. The discovery of the rapidity of exchange of mineral salts to bone and in teeth should lead to a better understanding of their normal state. A big advantage of isotope research is that isotopes can take part in living processes.

A number of diagnostic uses have become well established. Among them are locating of brain tumors and thyroid uptake. Not yet routine are isotopic methods of determining the volume of blood, circulation time, and other aspects of the heart's function.

Therapeutic uses of isotopes have been as external or internal radiation sources. Among the external sources are cobalt-60, cesium-137, tantalum-182, and strontium-90.

Radioisotopes also will prove highly useful in mass sterilization of bulk medical supplies and special items such as human bones for bone banks. U. S. industry is just now on the verge of undertaking such radiation sterilization programs.

Cost estimates indicate that a sterilization chamber can be built for less than $60,000 and operate at a cost competitive with that of steam sterilization.

NATIONAL BROACH model CCU-8 gear shaver has semi-automatic loading. It removes 0.008 in. of stock from 19-tooth transmission gear in 35 seconds.

GISHOLT saddle-type turret lathe is machining steel valve bodies. Turret-mounted JETracer permits boring difficult internal bore in one pass.

Tools of Tomorrow: Here Today

Digested from AMERICAN MACHINIST, Sept 26, p169

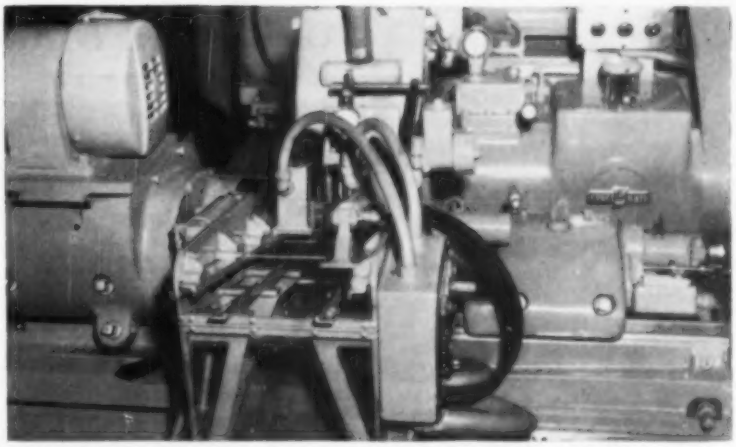
At the most successful Machine-Tool Show ever staged in the U. S. (Sept 6-17 in Chicago), top industrialists saw over 900 machines that will be turning out the automobiles, washing machines, and toasters of next year.

They not only saw the machines. They bought them too when they realized what the labor-saving, cost-cutting innovations incorporated in the machines could do to boost production economically on their production lines.

Some 1,600 foreign businessmen went to Chicago for the show. They came from Latin America, Europe, even the Far East. Substantial delegations were noted from various European nations, including important buyers from such companies as Fiat in Italy, Opel in Germany, and English Electric.

For the first time at any show, automation came into its own. It went a lot further than merely feeding and ejecting workpieces. It included numerically controlled, tracer-controlled and self-resetting machines. But general-purpose machines have not been neglected. New designs and better performance mark the standard machines that account for the major share of the industry's sales. Here is a capsule review of outstanding developments:

Boring — An outstanding improvement in precision boring machines is repeatability; one way this was achieved was the return to cam feeding of the table. Of unusual de-



CINCINNATI "Filmatic" plain grinder is automated for grinding armature shafts. Electric gage sizing provides feedback control for accurate grinding.

EX-CELL-O style 308 boring machine demonstrates how it can automatically generate internal and face contours. Cams control table and cross-slide. A separate set of cams is needed for each part to be machined.

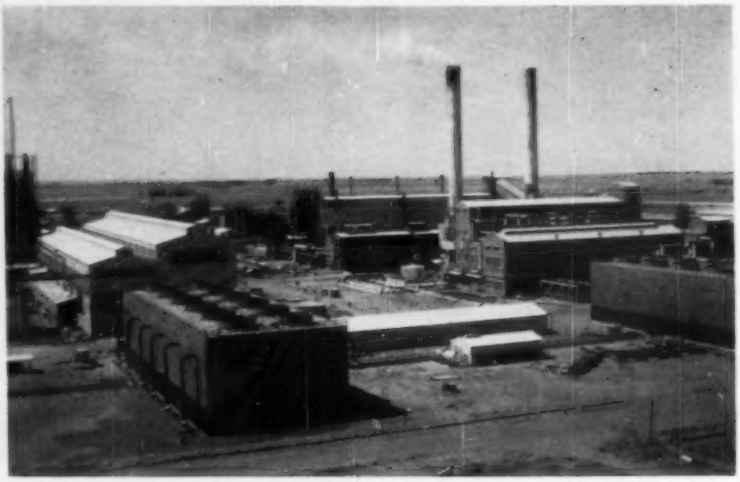
sign was one machine (Pope) having its bridge and table set at 45 degrees to simplify loading and unloading as well as chip and coolant removal. A few makers (Ex-Cell-O and Heald) now provide single- and multi-spindle vertical boring machines to simplify loading of flat parts.

Duplicating — Many lathes showed up with duplicating attachments. They included a Warner & Swasey turret lathe with the tracer unit mounted at 45 degrees on the rear of the cross-slide for operation with the spindle operating in reverse. A Monarch Hydra-Slide lathe with an air-gage tracer cycled automatically for straight or contour turning, facing, or boring. A Lodge & Shipley Copymatic has individual tracing heads that can follow either a facing or turning templet.

Milling—Higher accuracy, more power, greater rigidity, and convenience of operation were displayed by the new milling machines. Cincinnati Milling Machine Co.'s new dial-type millers are 50 to 80% more powerful than previous designs. Likewise, Kearney & Trecker millers are stronger, more powerful. Brown & Sharpe showed a toolroom miller on which horizontal, vertical, and angular milling operations can be done with one work setting.

Gear Cutting—Automatic loading and unloading featured many gear cutting and finishing machines. Notable design advances were incorporated in Fellow's transmission-pinion shapers, Barber-Colman's automatic hobber, Gould & Eberhardt's automatic cycling hobbers, Gear-grind's automatic grinder, National Broach's radial-feed internal-gear shaver, and Sheffield's automatic gear-deburring machine.

Control — Widely adopted throughout the show's machine tools was preselection of feeds and speeds so they can be applied at the touch of a button or automatically upon the completion of the previous operation. Methods ranged from a simple card placed over the change-gear lever to a fully automatic, tape-controlled machine that made three different parts alternately from a single tape that determined speed, feed, length of cut, and sequence.



WORLD'S FIRST synthetic oil plant goes on stream in South Africa

New Plant Makes Coal from Oil

Digested from COAL AGE, Sept, p54

Near Coalbrook, Union of South Africa, and atop a vast supply of its raw material, is the world's first large-scale synthetic oil-from-coal plant. It is government-financed and is operated by the South African Coal, Oil & Gas Corp.

The process employed at Coalbrook consists of gasification of the coal, and then conversion of the gas into conventional petroleum products and chemicals, using both American and German versions of the Fischer-Tropsch reaction technique.

Two big factors help make the plant economically practical:

- Availability of thick seams of cheap coal at a shallow depth.
- Heavy freight charges for transporting refined petroleum products from coastal points to the Johannesburg area, Coalbrook's biggest market. Gasoline can be shipped from the plant to Johannesburg for less than 25% of the cost of moving it in from the coast.

When in full operation, the Coalbrook plant is expected to save about $19.6-million of foreign exchange. This is from an annual production of about 55-million imperial gallons of gasoline and 16-million imperial gallons of other products, at a yearly product value of $25-million.

The three major raw materials for the plant are coal, steam, and oxygen. The total production of the synthesis gas—about 4.25-million cubic feet per hour—calls for 3,200 tons per day of coal, 440,000 pounds per hour of steam, and about 1-million cubic feet per hour of oxygen.

Coal is gasified in nine gas generators, under pressure, by passing oxygen and steam over it. This step employs the German "Rectisol" low-temperature extraction process. Ash removed from the coal by water sluicing is pumped to an ash dump. By-products of the gasification process are taken to the appropriate units for recovery of ammonia, phenols, tar.

Purified synthesis gas, mainly carbon monoxide and hydrogen, is passed on to the next stage in two streams. One is fed to the M. W. Kellogg Corp synthesis plant; the other to the Arge (German) synthesis plant.

The output of both units is then further refined. Light hydrocarbons are recirculated. A by-products section separates gasoline from ammonia, phenols, and other materials. Final effluent is treated to make it suitable for waste disposal in a sewage plant. Production cost of gasoline is about 16.3¢ per imperial gallon.

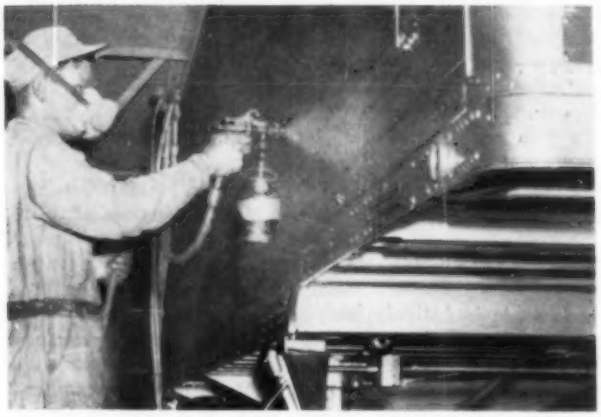
▶ HOW TO . . .

. . . locate floor vibrations

Does excessive vibration interfere with the accuracy of some of your delicate machine tool operations? Parker Appliance Co. (Cleveland, Ohio) had to install two grinders recently, for working on jet aircraft parts. Tolerances required were close—down to 0.0001 inch in some cases. Special units to dampen vibrations would have cost $6,000. Parker decided to save money.

Two experts from the Seismological Observatory of John Carroll University were called in. With a seismograph they measured vibration at five possible locations in the plant, and recorded them with a two-channel pen recorder. Result: the best vibration-free location was discovered and the grinders were installed. Operation was excellent—without dampeners.

Digested from FACTORY MANAGEMENT & MAINTENANCE, Sept p141



. . . protect aluminum surfaces

This aluminum trailer is being sprayed with a clear, water-white lacquer coating that will protect its surface against corrosion and pitting. The coating has been developed by Eastman Chemical Products, Inc., and Egyptian Lacquer Mfg. Co.

In a recent test, one aluminum truck-trailer was sprayed with the new lacquer—another trailer was not. After 10,000 miles on the highways, the uncoated trailer began to show the first signs of corrosion, but the aluminum surface of the lacquered trailer was still shining bright.

Digested from BUSINESS WEEK, Sept 3, p52

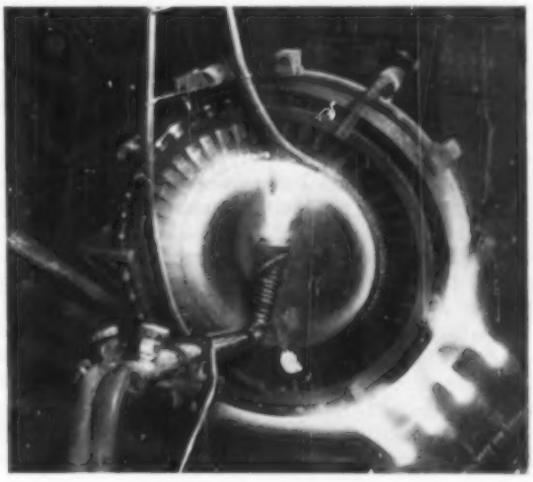
. . . cut silver-brazing costs

A new semi-automatic silver brazing process at Sawyer Bailey Corp. (Buffalo, N. Y.) has resulted in a 60% savings in man-hours and 68% in silver-alloy brazing material in the manufacture of fan-assembly rotors and stators.

Powdered silver alloy is applied by gravity feed from a hopper to the rotor hub at a rate that produces the right coat after two revolutions of the assembly. It drops through the flux previously brushed on and flows into joints as it heats. Resulting joints are strong and good-looking.

During brazing, clips hold blades firmly against the rotor hub. For stators, clips are not needed as an outer ring holds blades in place.

Digested from WELDING ENGINEER, Sept, p52



Development as foams has opened the door to other possible applications for polyurethanes in adhesives, fibers, paints, rubbers. Prices are still high, but once the big new plants are operating and in full production, prices will fall. More new uses will then blossom

Polyurethane Output Grows

Digested from CHEMICAL ENGINEERING, Sept, p112

A new group of synthetic polymers—polyurethanes—is generating as much enthusiasm as greeted the development of nylon. Made by reacting isocyanates with polyester resins, polyurethane foams are already competing with foam rubber both here and abroad.

These foams, either flexible or rigid, are not only lighter and stronger than foam rubber, but also resistant to oil, dust, drycleaning solvents. They can be made in a variety of densities under simple procedures; will not rot, age or tear; have excellent insulating and electrical properties; can be dyed, sewed, glued, cut into any desired shape.

With this list of credits, they are finding application in everything from life preservers to linings for clothing, mattresses to machinery insulation, and sponges to seat cushions.

But that is not all. Up-and-coming polyurethane products include adhesives, wire coating, paints, fibers, and urethane rubber tire treads that will last the full life of the car.

Heading the list of domestic producers are E. I. du Pont de Nemours & Co., Inc., and Mobay Co. The latter firm, formed last year, is a jointly owned corporation of Monsanto Chemical Co. and Farbenfabriken Bayer A. G. (Leverkusen, Germany).

Other isocyanate (a polyurethane raw material) programs have been started by: Allied Chemical and Dye Corp.'s National Aniline Div., B. F. Goodrich Co., Carwin Co., and Food Machinery and Chemical Corp.'s Westvaco Chemical Div.

Keeping up with expanding raw-materials facilities are a number of foam-making firms, among them Nopco Chemical Co. and American Collo Corp. Both are expanding their facilities.

Basic research and development on polyurethane chemicals began almost simultaneously in the 1930s by Du Pont and part of the I. G. Farben chemical empire. Since World War II, Monsanto, Farbenfabriken Bayer A. G., Lockheed Aircraft Corp., and Goodyear Tire and Rubber Co. have entered the field.

Key components of a wide range of polyurethanes are the isocyanates and polyesters. When they react, the active hydrogen of the polyester hooks on to the nitrogen of the isocyanate molecule; the rest of the ester molecule links up with the carbon in the isocyanate group.

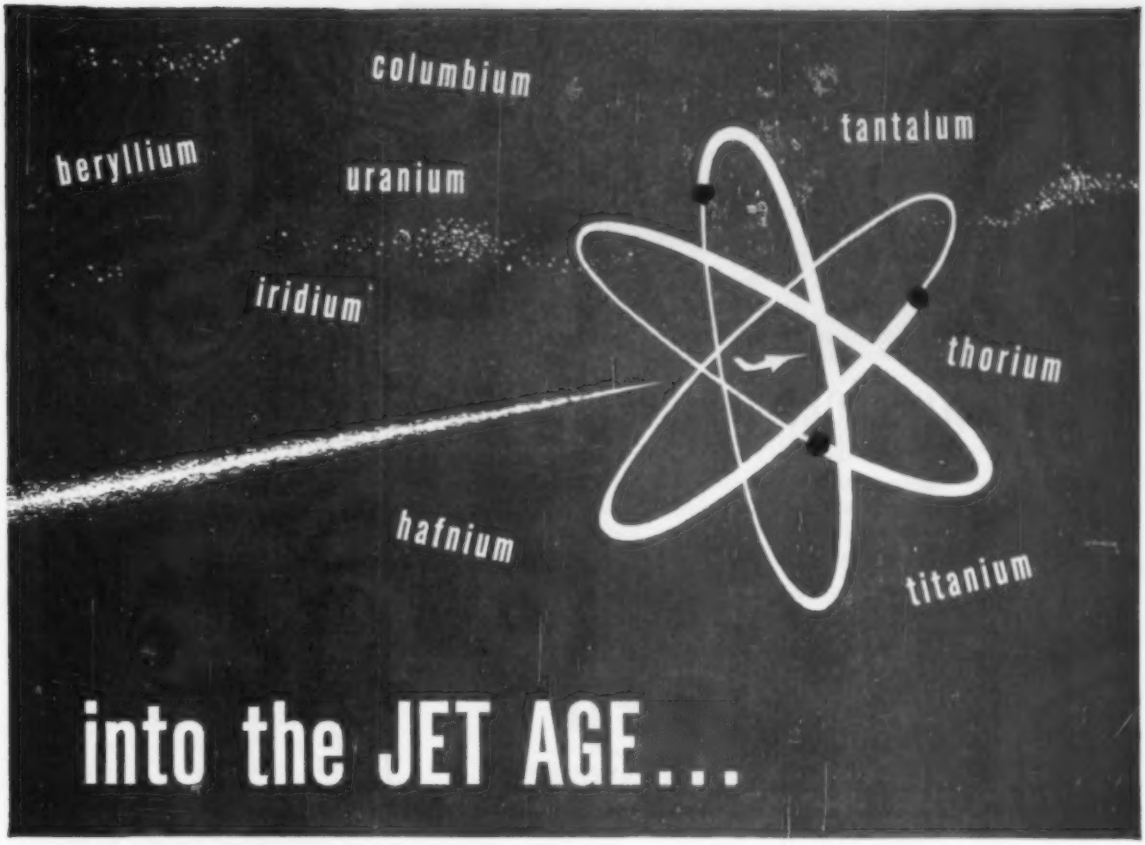
Typical starting materials are tolylene diisocyanate and the polyester resulting from the reaction of edipic acid and ethylene glycol. The addition of water to this mixture results in the generation of carbon dioxide, leading to the formation of polyurethane foams.

A typical foam formulation outlined by Mobay consists of 35 to 40 parts isocyanate; 100 parts polyester; 7 to 8 parts water, catalyst, dye, and surfactant for pore-size control.

These materials, at temperatures below 25°C., are carefully metered, then fed into a mixing head that moves back and forth over an open mold traveling beneath it. As soon as the reaction mixture hits the mold, foaming starts. Complete conversion to foam takes place in less than 4 minutes.

The product can be soft or rigid, with a density range of 1.5 to 6 pounds per cubic foot. It maintains its properties over a wide temperature range, —20° to 175°F.

Cost is still comparatively high. Weight for weight, polyurethane foam is more expensive than foam rubber, but, volume for volume, it is cheaper. And the new, but as yet unmarketed, polyurethanes—adhesives, paints—will be higher priced than their competitors. But, as production increases, prices are sure to drop.



Rarer Elements now serve the Men of Science

☆ As man crashes through the sound barrier, we find new words being used to describe the miracles wrought by today's men of science and research . . . words like *electronics — guided missiles — nuclear fission — transistors.*

Helping to make these scientific advances possible are the technical skills and vast experience of the mining industry, now being utilized to develop the rarer elements. Rocks and minerals formerly of no commercial interest have thus come into production . . . including *aplite, nepheline, syenite, olivine, perlite, pinite, topaz,* and many more.

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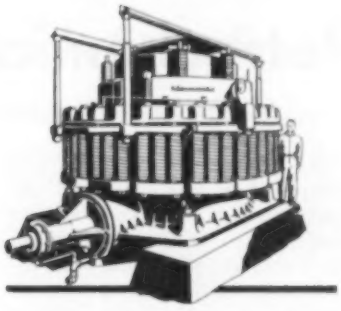

SYMONS Cone Crushers are built in Standard, Short Head, and Intermediate types, with crushing heads from 22 inches to 7 feet in diameter—in capacities from 6 to 900 tons per hour.

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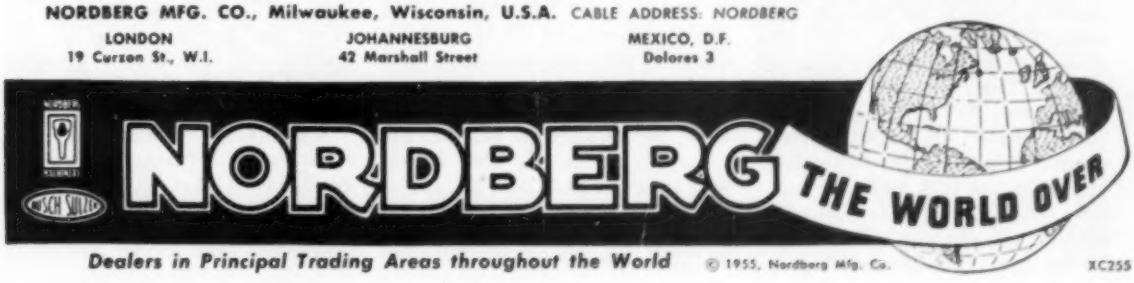

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Production Outlook: These are the . . .

Petrochemicals to Watch

Digested from PETROLEUM PROCESSING, Sept, p1390

The volume of petrochemical products has about reached the point where it commands respect from refiners familiar with trading in straight petroleum oils. Already some have reached 1-billion pounds in specific fields. Others will join this group in the near future. Here is the significance: It takes 4-million barrels of petroleum oils to make 1-billion pounds of petrochemicals.

Principal markets for petrochemicals lie in the plastics, synthetic rubber, synthetic fiber, and other chemical manufacturing groups. These are the trends:

Plastics—Polyethylene is the leader here. By 1960, output should triple—reach 630-million pounds in the U. S. alone. Volumewise, only vinyl resins and polystyrene will outrank it.

The new "low-pressure" polyethylenes will boost consumption. In place of high temperatures and pressures in a polymerization reaction, the new materials are made by a continuous process employing a catalyst and operating at low pressures and temperatures. The result is a four-and-one-half times increase in tensile strength over the present polyethylenes. Low-pressure polyethylenes will withstand temperatures of 175°F. without becoming brittle and will not soften up to 250°F. These and other superior qualities will open up entirely new fields for polyethylene plastics.

Also fast growing in the plastics field, but smaller in volume, are the epoxy resins. By 1960, output will have jumped from 23-million pounds in 1954 to 82-million pounds. In finished form, epoxies are super-phenolics.

The other principle plastics derive mostly from petrochemicals. Last year, U. S. output reached 3-billion pounds; by 1960, output will be about 6-billion pounds.

Synthetic Rubber—Higher synthetic-rubber output in the next few years will expand this market for butadiene, styrene, acrylonitrile, plasticizers, and carbon black.

Experts place world rubber demand (both natural and synthetic) by 1960 at over 3-million tons. But maximum production of natural rubber is not more than 1.8-million tons yearly. And it is not likely to grow much. Political conditions in natural-rubber growing areas are sure to limit any investment aimed at raising production. Thus synthetic rubber will have to fill the gap.

Synthetic Fibers—The outlook for fibers is modest growth compared with the past 10 years. The future large-scale growth will come through varied industrial applications being found for them. The petrochemicals involved include cyclohexane, benzene, phenol, butadiene, acrylonitrile, ethylene, and paraxylene.

Ammonia—Capacity to produce ammonia, the largest volume petrochemical, is certain to grow. Biggest outlet for ammonia will be agricultural chemicals. But other outlets are appearing. Emphasis is now being given to the manufacture of urea from ammonia. Urea has a higher analysis than other forms of nitrogen and also diversified markets outside the agricultural field.

Additives and Detergents—Additives for liquid fuels and lubricating oils provide a growing market. New types of motor fuels are appearing on the horizon—all of them require petrochemical additives. In the synthetic-detergent market, the outlook nowhere shows a peak in growth. Alkyl aryl sulfonates continue to occupy the largest share of the market, but there is a growing market for the liquid nonionic types based on ethylene oxide.

A significant development in oil recovery will further boost the detergent market. Adding a detergent during water flooding operation helps recovery from oil wells.

For Fresh Water...

. . . free of salt and minerals, perfected "electric-membrane" demineralizers are available

Digested from CHEMICAL ENGINEERING, Sept, p246

Three years ago, use of electric membranes to demineralize water was a new and novel idea. (McG-H Digest, July '54, p45). Since then the process has undergone intensive development and testing. The result: perfected demineralizers are now commercially available in two basic models from Ionics, Inc. (Cambridge 42, Mass.).

Wherever it is difficult to obtain pure water, but where brackish or mineralized water is available—or sea water, of course—the electric-membrane demineralizer can give you fresh water. These are locations where water now must be distilled, or transferred long distances by pipeline, or hauled by truck or ship—or even stored from seasonal rainfall.

The total cost of fresh water produced from electric-membrane equipment—in the moderate-size range—is lower than the cost of water produced by any of the methods indicated above. "Moderate size" units demineralize from 1,000 to 100,000 gallons of water per day.

Initial investment costs vary considerably. For example: a plant handling 20,000 gallons per day, and capable of removing 40% of all salts and minerals, would cost about $0.50 per gallon per day of capacity. A 20,000-gallon-per-day plant, capable of removing 87% of all salts and minerals, would cost $2.00 (or more) per gallon per day of capacity.

Chief operating cost is for the consumption of electrical energy, which varies in proportion to the salt content of the water being treated. Brackish water requires approximately 7 to 30 kilowatt hours per 1,000 gallons.

The electric-membrane process, in one sense, is the exact reverse of other demineralization methods—it removes salt from water, rather than water from salt. Therefore, its efficiency is greater.

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Easier To Ship Overseas:

Super-Frozen Foods Stay Fresh

Digested from FOOD ENGINEERING, Sept, p65

Big commercial possibilities are foreseen for a radical new super-freeze way of shipping foods—without refrigeration—any distance and to any climate. The technique eliminates the danger of the product thawing. It is called "Super Chill" and was developed and tested by Libby, McNeill and Libby (Chicago).

To demonstrate the method, a full-scale test run was made from Chicago to equatorial Venezuela. Carried in the test shipment were frozen vegetables, fruits and juices. Three points explain the technique:

1. The foods were super-frozen to the extremely low temperature of −150°F. by using liquid nitrogen (−320°F.) as a direct-contact refrigerant.

2. Thawing of foods enroute was avoided by the low freezing temperature plus use of a special insulated shipping container. The container—7x7x7½ feet, with a 6,000-pound capacity—is made of aluminum and has 6 inches of insulation on all sides.

3. The 2-week trip was successfully accomplished without use of any conventional refrigeration equipment.

W. C. Mitchell, Libby vice-president, points out several advantages: (1) The system does not require men to handle goods in cold, uncomfortable work areas. (2) Compactness saves shipping space. (3) Most important, no motorized or other special refrigeration equipment is needed. (4) Maintenance on transport carriers is absolutely no problem.

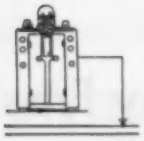
A new overseas market for Libby is in sight—a big market, according to Mitchell.

Where Performance Counts

WALLACE & TIERNAN EQUIPMENT IS USED

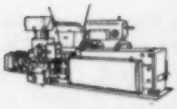
PRESSURE SENSITIVE INSTRUMENTS

The W&T Sensitive Altimeter, shown above, was used on a reconnaissance survey where quick, accurate results were required. The W&T Altimeter was chosen because of its dependability, rugged durability and high order of accuracy. These qualities are typical of all W&T's aneroid and mercurial pressure sensitive instruments, many of which are used in exacting research work and production testing.



CHLORINATION

Equipment includes chlorinators of both the water and mechanical diaphragm types in all capacities, hypochlorinators, and many other auxiliary and accessory items designed for use in the treatment of water for sanitation as well as for numerous industrial purposes.



PROCESS FLOW CONTROL

Equipment includes chemical solution feeders, gravimetric and volumetric dry feeders, and gravimetric meters for use in the chemical, grain, and food processing industries.

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Includes a number of protective devices for navigation such as buoys, lamp changers, flasher mechanisms, signal timers, fog horns, air craft flasher units and other related apparatus designed for use in the marine and air transportation field.

Other quality Wallace & Tiernan products and services used throughout the world are listed below. For further information send for list number F-104 of available free technical publications on all Wallace & Tiernan products.

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F-104

Machining Layouts

Fast, economical method gives lines on plastic or metal that will not smear or wash off

Digested from AMERICAN MACHINIST, July 18, p120

Metal or plastic templets are laid out for machining at Diamond Fuze Laboratories (Washington, D.C.) by a new photographic method. The usual photographic method is unsuitable for plastics.

The surface of the metal or plastic block is roughened slightly to permit good adherence of the enamel on which the pattern is applied. The block is then fastened to a turntable or other spinning device.

The prepared surface is covered with cold-water enamel, a water emulsion of shellac sensitized with potassium dichromate. Spinning at 250 to 300 revolutions per minute dries the enamel. Applying the enamel is done in the dark because it is sensitive to light.

A negative, either film or glass, of the machining layout transfers its pattern to the enamel. With the emulsion side of the negative against the sensitized-enamel surface, ultraviolet rays are directed through the negative to the surface. Exposure time varies, depending on sensitized-film thickness, time of film drying, distance from light source, and strength of light source. Usual exposure is 4 to 5 minutes at 6 inches from a 275-watt reflector sun lamp.

The exposed surface is developed in a solution of methyl violet in methyl alcohol. Washing in tepid water removes all unexposed areas and leaves a clear sharp pattern. After drying, the plate is returned to the spinner, a second coating of emulsion is applied, and the plate is re-exposed to form a protective, insoluble film over the pattern.

The layout pattern may show hole location only, or it may also give hole dimensions, types of components to be inserted in assembly, and lines to indicate cross-over connections to be made in assembly. The time required to apply a pattern to a templet is about one-quarter of that needed for conventional methods.

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Powder Metallurgy . . . What Europe Is Doing

Digested from METALWORKING PRODUCTION, Aug 19, p1449

Emphasis in European powder metallurgical practice is on quality. European designers and production engineers have a critical attitude toward the physical properties of sintered machine parts and demand quite close tolerances. In fact, the trend toward high quality is probably greater in Europe than elsewhere, even in the U. S.

The demand for quality sintered parts has resulted in nearly 20% of the market being filled by electrolytic iron powder and 40% by sponge iron powder. The superiority of electrolytic powder is particularly valuable in making high-density parts and the upper range of medium-density parts.

European demand for powders suitable for high-density parts has led to the development of a sponge type of iron powder with a 2.8 density. This powder (called MH-100V) has improved compressibility, but its sintering properties require high sintering temperatures or times. When mixed with copper, it appears to have excellent mechanical properties.

As yet, no prealloyed powder has been developed in Europe for mass production of parts. The general opinion is that prealloyed powders have poor compressibility properties. But experiments at La Métallurgie des Poudres in Paris and at Höganäs-Billesholms Aktiebolag in Sweden indicate that adding 2 to 3% of copper gives excellent compressibility.

A 2½% iron-copper-powder, when sintered and precipitation-hardened, yields tensile strengths above 50,000 pounds per square inch. It is "non-growing" during sintering. It can be case-hardened. It yields a fine-grain martensitic structure.

In Europe, about 30% of iron powder consumed is thermally treated. This is done in the parts manufacturers' plants before the powder is mixed with lubricants and other metal powders.

This practice, more prevalent in Europe than in the U. S., permits the use of freshly reduced powder. The advantage is a lower oxygen content, which increases tensile strength and elongation.

The necessity of using iron powders with low oxygen stems from the demand for high-quality parts. Both mechanical properties and dimensional accuracy depend on the oxygen content.

Alloying powders are frequently mixed with the iron powder before the final reduction process. Pre-reduced powders are preferred when the mixtures contain silicon, chromium, magnesium, and other alloys likely to oxidize readily.

Powders, before compacting and sintering, are thoroughly mixed with lubricants. Other metal powders may be added to make alloyed, heavy-duty, sintered-steel parts.

Most frequently used lubricant is zinc stearate. Others are stearic acid and graphite. Stearic acid is often added as a "master" lubricant, which is made by hot mixing of iron powder and 5 to 10% of molten stearic acid and 2½% to 5% of graphite.

Research conducted at Höganäs on the influence of different proportions of zinc stearate to iron powder on compressibility and ejection force showed that:

1. For each compacting pressure, a certain amount of zinc stearate gives the highest density of the sintered part.

2. The optimum (best) amount of zinc stearate varies for different iron powders.

3. The optimum amount decreases with increasing pressure. For example, 0.5% of zinc stearate gives best results with a pressure of 120,000 pounds per square inch, but at 30,000 the optimum is not reached with 3% zinc stearate.

4. At constant compacting pressures, the ejection force decreases with increasing amounts of zinc stearate.

5. The ejection force increases with increasing compacting pressure.

Use Motor-Exciters

Trend is toward motor-driven exciters for turbine-generators. Advantages are many

Digested from POWER, Sept, p101

Motor-driven exciters have advantages over generator-shaft-driven units. These are typical:

- Separate motor-driven exciter cuts over-all length of generating unit.
- The motor-exciter may be located to conserve floor space.
- Extended maintenance on a shaft-driven unit requires shutting down the prime mover and generator. This is not so with separate motor-driven units.

Most exciters in use today are special direct-current generators, but static rectifiers may be used. Although large and small turbine-generators have motor-driven exciters, widest application has been on larger generators where direct-driven exciters do not meet all the requirements.

Certain characteristics apply only to a motor-driven exciter. Motor-driven set must be capable of delivering ceiling excitation (maximum voltage an exciter will reach when operating under specified conditions) and response for sustained motor terminal voltage as low as 70% rated voltage.

With generator-exciter set output held constant at rated load, motor is subject to a 2-second throwover to voltage source 70% of rated. The exciter must recover to rated speed. For all typical system faults, including a three-phase fault at the high-voltage bus, permissible fault-clearing time has to be equivalent to that of a turbine-shaft-driven exciter.

Typical construction utilizes a common base for motor and exciter. Both units are then enclosed in a steel housing designed for quick access to either machine. The cooling system depends on the user's particular needs.

Standard industrial motor-generator sets will not meet the requirements of a turbine-generator unit. A motor-driven exciter used as the main excitation source for turbine-generators must be designed for this specific application.

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Reuse Your Paper

New waste-paper recovery method renders fibers as good as those from pulp wood

Digested from PAPER INDUSTRY, Aug, p435

The new method, developed in Austria by Georg Eineder, disintegrates all chemical and physical elements in any waste paper, but not the cellulose fibers. This is done, the inventor claims, without damage to the cellulose fibers.

The Eineder method swells the paper so that chemical and other foreign particles around the fibers are loosened. If the paper has been treated with water-repellent chemicals, no swelling can take place and the process will not work.

The paper is dumped into an airtight container, from which air is then exhausted. A liquid charge, consisting of water and three chemicals, is injected. In the absence of air, the liquid penetrates and wets the paper mass evenly and completely.

The wet paper is transferred to the main disintegrator, which is fitted with a vertical shaft and agitators. Agitation then removes foreign particles from the fibers. These particles—glue, resin, or printing inks—are drained off, while the cellulose fibers pass on to a cleaning machine.

As many cellulose fibers still cling to each other, they are transferred to a micro-disintegrator having 12 stages of increasing intensity. Here the last traces of foreign particles are removed and fibers separated. Fibers are then dehydrated and pressed into sacks or rolls for shipment to paper mills. The recovered fibers can be added directly to the wood pulp used in papermaking.

The smallest type of the proposed Eineder factory would have a daily capacity of 20 metric tons. About $75,000 investment would be needed for a factory with an annual output of 6,000 metric tons. This amount of reusable cellulose fibers would save about 875,000 cubic feet of wood. Price of cellulose pulp would be only 20% above the cost of the waste paper. The prospects for economy are indeed bright.

For Locating Oil . . . A "Neutron Generator"

Digested from PETROLEUM WEEK, Aug 26, p15

Are you looking for a device that will tell definitely whether a particular pocket of underground fluid is oil, gas, or just plain water? McCullough Tool Co. (Los Angeles) has produced such a tool—called a "linear neutron generator."

Combined with other "logging" apparatus, the tool has two main functions: (1) to distinguish between oil, gas, and water and (2) to identify absolutely a particular underground formation. Up to now there has been no way of determining the exact nature of fluid underground.

The new tool is virtually a miniature atom-smasher. It is used in conjunction with a gamma-ray spectrometer. The tool is lowered into the well bore. A truck at the surface furnishes the necessary electric power. The tool generates millions of electron volts of neutrons—which, in turn, act upon the fluid formation, causing it to give off gamma rays. The gamma rays enable the spectrometer to identify the underground fluid. Field tests are now in progress.

New

Smokeless fuel from volatile coal has been produced by a new process developed at the Institute of Gas Technology. The coal, with a volatile content of 25 to 38%, is devolatilized and crumbled.

Pulverized coal granules are fed from a hopper, by screw conveyor, into a short, tubular vortex chamber. At the same time, air at 400° F. is fed into the chamber at a high enough rate to entrain the pulverized coal.

More air at 800° to 1200° F. is then charged into the chamber, causing the coal particles to become partly devolatilized. Vapors released within the coal cause the granules to crack—in turn, the coal is further devolatilized to about 6%. The hot product can be immediately pressed into briquettes—no binder is needed.

Digested from CHEMICAL ENGINEERING, Sept, p240

One of the compact, odor-free, Duo-equipped waste treatment plants on the Pennsylvania Turnpike.

Big Things NOW COME IN SMALL PACKAGES

No longer need waste treatment be a major problem to small towns and other municipal and industrial sources of pollution with population equivalents up to 5000. Now Dorr Duo units bring "big city" treatment facilities down to a realistic investment cost. How? By an ingenious design that allows a single unit to perform a dual purpose.

Here's a good example. A high degree of treatment is required at the various restaurant and service areas on the Pennsylvania Turnpike. One Dorr Duo Clarigester and one Dorr Duo Filter are installed at each of four stations to provide the identical degree of treatment that would normally have required five separate units. Installation and operating costs are lowered, space requirements are reduced, and operational headaches are practically eliminated.

Whenever a process involves the separation of finely divided solids in suspension, the use of ion-exchange or fluidizing techniques, Dorr-Oliver and its Associated Companies throughout the world can provide the correct equipment for the job.

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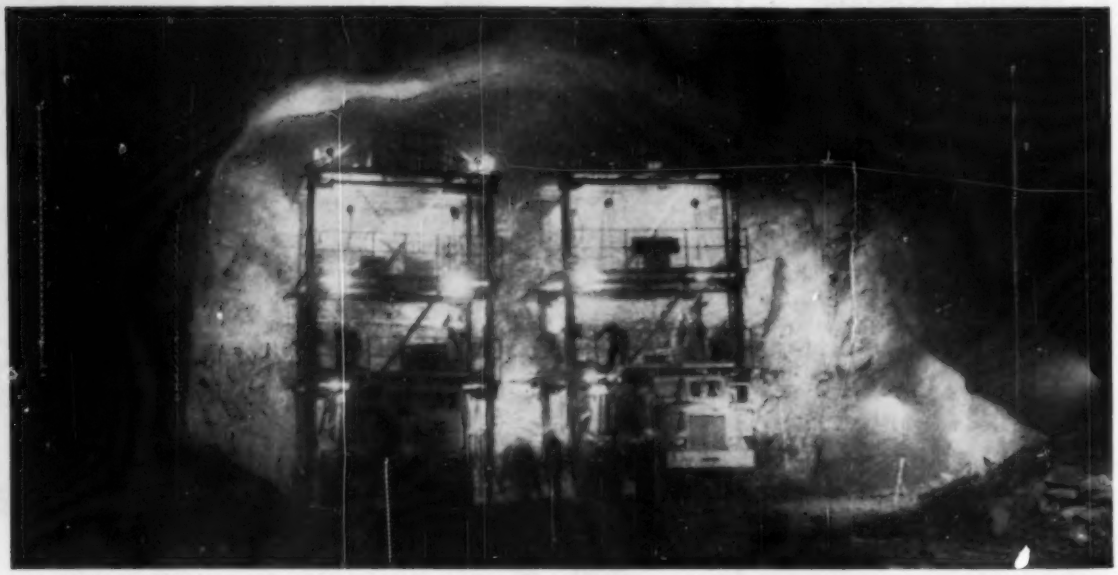
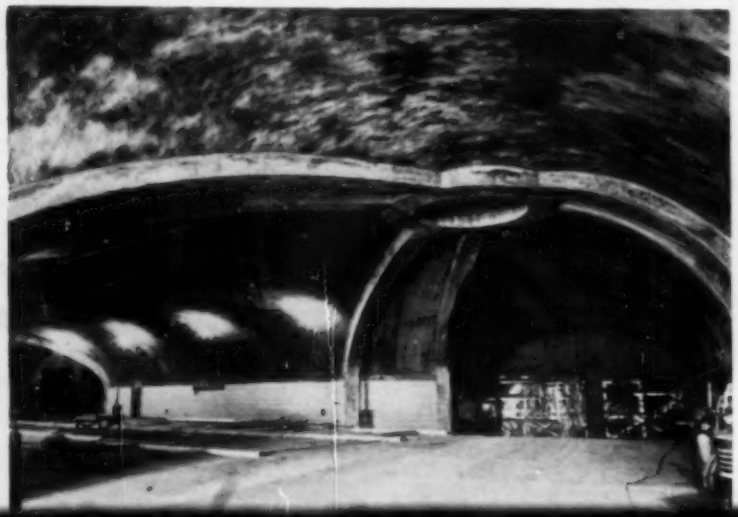


DRILLING JUMBOS are carried by trucks to face of top heading of the Stornorrfors tunnel, Sweden's biggest. The top heading represents 45% of the total 3,875-square foot section, the remainder to be taken in two benches.

ONE-MAN ROCK DRILLS are accepted tools of Sweden's tunnelers. These views show the usual pneumatic pusher leg (left) and the drill (right).

CONCRETE ARCHES support roof of big main entrance to Stockholm air-raid shelter-garage. Area to the left will house a filling station for automobiles.



Swedes Set

Digested from ENGINEERING NEWS-RECORD, Sept 1, p34

The Swedes are in the process of extending their fame into a new area—rock tunneling. Swedish prowess in this respect is currently on view at several outstanding projects—particularly two hydroelectric plants in the north and an air-raid shelter-garage in Stockholm.

Most "large" tunnels, before Sweden began tunneling in earnest, had cross-sectional areas of about 1,500 square feet. The latest tunnel in Sweden will have a cross-section of 3,875 square feet and several others range from 2,200 to over 3,000 square feet.

Records for fast driving and mucking have been set only to be beaten on the next job. For example, on another of Sweden's current projects, a top heading of 1,410 square feet was advanced 492 feet in March to establish what appeared to be a new record, only to have the advance in May go beyond it to 515 feet.

There are a number of reasons for the Swede's success with rock tunneling: Sound granite rock—good for tunneling without roof

MECHANICAL SCALING PLATFORMS promote speed and safety in big Swedish tunnels. Here scalers ride on the end of a boom mounted on a truck.

Rock-Tunnel Records

supports—exists in most of north and central Sweden. Experienced tunneling crews are available along with excellent equipment and know-how.

But perhaps most significant is the opportunity to do many rock jobs presented by Sweden's emphasis on underground facilities for safety during wartime.

A look at some of the bigger projects provides some idea of the scope and imagination employed by Sweden's engineers.

Typical of Sweden's hydro rivers is the Ume. It has a large flow, steep gradient, and a route through a lake, whose outlet has been controlled so that an effective regulating reservoir of 455,000 acre-feet is provided. Two hydroelectric projects are underway on the Ume—Harresele and Stornorrfors. The Harresele project is a modest appearing construction project above ground. But the discharge tunnel, 49 feet wide, 59 feet high, and 11,154 feet long, together with the underground power plant, presents the major construction task.

The powerhouse will contain three turbine-generator combinations. It is an enlarged extension of the tunnel, being 52.5 feet wide and 295 feet long, with a height of 140 feet. Total excavation for the powerhouse and its auxiliaries amounts to 187,330 cubic yards. This, together with the 1,113,500-cubic yard volume of the discharge tunnel, is a truly big rock job.

At Stornorrfors, the discharge tunnel is 3,875 square feet in area. It is probably the largest undertaken anywhere. The underground powerhouse will have space for seven 130,000-kilowatt generators, believed to be the largest in the world.

While not as spectacular as Harresele or Stornorrfors, the under ground air-raid shelter-garage in Stockholm has its merits. It will accommodate 600 cars on three levels as a garage. As a shelter, it is designed for 6,000 persons—20,000 in an emergency.

The layout consists essentially of a 1,000-foot tunnel, 42 feet wide and 33 feet high, terminating at either end in a circular room 43 feet high and 85 feet in diameter. Access tunnels branch off from the rooms to the ground.

New Techniques in . . .

Built-Up Beams, Plaster Walls

Digested from AMERICAN BUILDER, Sept, p200

Using short lengths of lumber to build extremely long spans of built-up beams, the Swedish-designed HB beam represents one answer to the problem of using timber to carry large loads in an economical manner.

In its basic form, the HB beam consists of an I-section beam in which both web and flanges are formed of standard timber sections. Internal forces are transmitted by means of gluing and a carefully designed system of nailing.

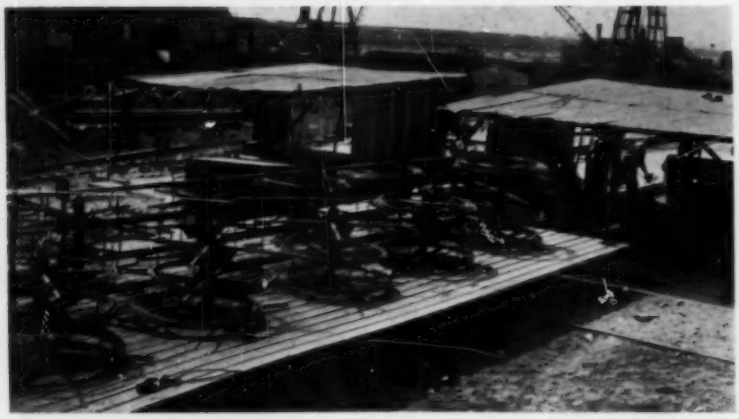
Webbing is two solid courses of 1-inch-thick boards set at right angles to each other. Flanges are glued-laminated 1-inch members, pressure glued to form continuous members of varying thickness according to the location of high or low stresses. Flanges are fastened to the webbing by a special-shaped nail. On structures to date, spans have ranged from 35 feet to more than 350 feet.

In Australia, load-bearing plaster walls only 2¼ inches thick are the sole support for roofs of houses. No other framework of brick or timber is employed.

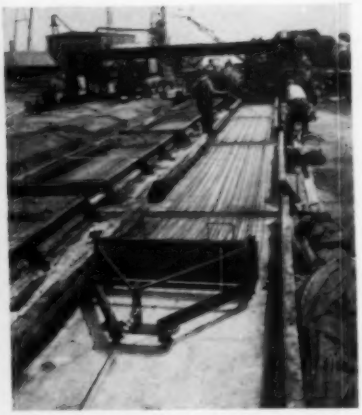
The precast plaster wall system, pioneered by George Castley in Melbourne, has been government-approved. Castley's walls are reinforced with a 6-inch galvanized iron mesh. There have been two recent improvements. Through overlaying a sisal fiber with the mesh, crack resistance has been increased during transportation and on-site erection; and corners, originally tied with galvanized wire, are now secured with plaster-soaked sisal fibers.

The internal plaster structure remains rigid even if there is movement in the foundation, and continues to support full weight of the ceiling and roof. Even if the movement were great enough to crack the wall, the plaster can be quickly, cheaply and invisibly repaired.

Cost of a plaster wall home is two-thirds that of a comparable size cavity-brick model, its nearest structural equivalent.



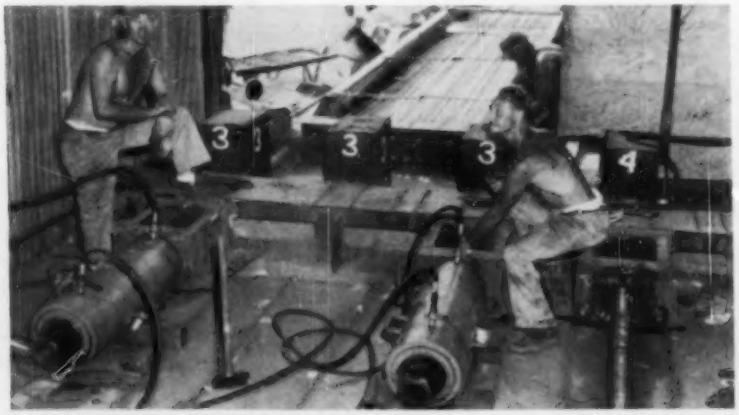
1 MOVABLE PLATFORM mounts double line of spindles that carry 47 reels of high-strength strand. Reels unwind to feed strands into tube guides.



2 DOLLY carrying templet is pulled down casting bed as wires unreel.

3 TEMPLET attached temporarily to dolly is pulled beyond anchor.

4 STRANDS extending beyond templet at jacking end of bed are cut easily by a portable electric saw mounting a metal-cutting blade.



5 Two jacks are connected to jacking beam. As rams extend, workmen turn up nuts in front of jacks. When jacking is completed, nuts take up tension.

6 REINFORCING BARS are tied across strands near anchor.

Tricks Aid Slab Prestressing

Story Begins on Next Page

Digested from CONSTRUCTION METHODS & EQUIPMENT, Sept, p58

Contractors continue to turn up new tricks for improving mass production of pretensioned concrete units. They have developed ways to unreel wire faster, place forms more easily, and simplify jacking.

One of the smoothest prestressing jobs now under way is at the New York Port Authority's new Pier "A" in Hoboken, N. J. J. Rich Steers Corp. of New York is precasting and pretensioning about 2,000 deck slabs. With a six-bed casting yard, it turns out 24 units a day. The 5-feet wide precast slabs are 19½ feet long and 1 foot thick. They are prestressed with 48 strands of ⅜-inch Roebling wire placed in three levels. Each strand is stressed to 173,000 pounds per square inch.

Reels, jacks, and other equipment can be easily moved to any bed. The procedure is simple. Strands are locked in a templet that is pulled down the bed and anchored at the far end. Strands at the jacking end are cut, locked in a similar templet, and tensioned. Concrete is then poured over the strands. When the concrete attains a strength of 4,200 pounds per square inch, the strands are cut and the slabs are stockpiled. Clark fork-lift trucks haul slabs to barges for towing to the pier site.

New

High-pressure air transmission makes possible individual room temperature control, flexible interior planning, and more usable office space in two New York City office buildings. In both systems, air is moved at high velocities from central heating and central cooling sources and delivered at high temperature differentials for mixing at control boxes. These lead to either ventilation outlets or branch ducts supplying complete zones.

Small ducts transmit air at high pressures with resultant saving in space. Small flexible branch ducts can be relocated easily. High pressure provides excess capacity and so make possible tap-offs for additional outlets.

Digested from ARCHITECTURAL RECORD, Aug, p204

YOU AND YOUR PERSONAL AFFAIRS

Nearly everyone dreads going to a hospital. And hospital officials say that businessmen are more likely than most to be nervous because no longer are they in command of the situation—they must take orders, not give them.

The unknown causes the fear. So a good idea is to ask your doctor what you may expect in the hospital—tests, post-operative effects, etc. And don't be ashamed to ask as it may prevent an unnecessary nervous ordeal.

Visit the hospital ahead of time. It will give you an idea of its facilities and a greater sense of security as a patient. It will also prevent you from expecting more service than you need. Unless you have a private nurse, you may have to wait for service.

A warning: during convalescence, watch out for mental depression caused by boredom. It can delay your recovery. So prepare for it. Look on your hospitalization as a chance to catch up on some of the things you never have had time for—such as that certain book or your correspondence.

✦ ✦ ✦

Mr. Executive's Wife—this is for your eyes only. First, a question: Do you appreciate the tremendous influence you have on his business success—and on the success of his company? You can help him get ahead even more by applying these ideas:

Know your husband's job. You can then be tolerant of his working hours, help him from feeling beaten and discouraged. Be his "escape valve" when he bottles up too much internal pressure, by encouraging him to talk and to get back to a normal state of mind.

Help him set a goal. Whether it be a house in the suburbs and children through college or high recognition and prestige, define it and plan for it. This will mean, too, your help in budgeting the income.

Keep him well. Think about his mental as well as physical health, and see that he gets a chance to relax.

Help with his appearance. Begin by making sure he has adequate and proper clothes for his job and that they are taken care of. Unfortunately, a lot of men put off buying clothes and take little care of what they have.

Be flexible where and how you live. Move willingly if he is transferred. And entertain willingly if your husband's business and success call for it.

✦ ✦ ✦

Are you going to Great Britain soon? If so, a new revised handbook can help you prepare for your trip. "Britain: An Official Handbook," published and sold by the British government, can guide you on the country's political, social and industrial life.

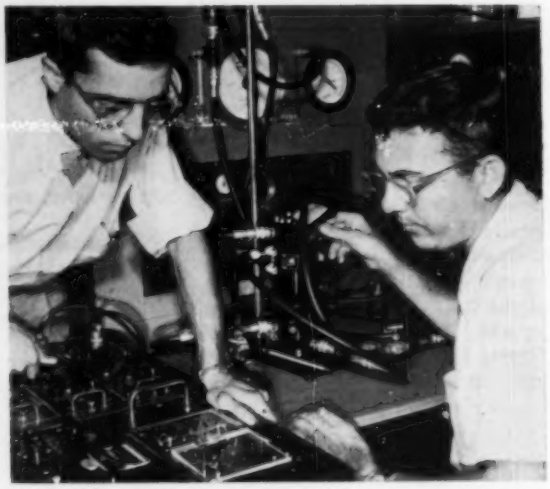
YOU has been compiled from American Business, Business Week, Factory Management & Maintenance, and other sources.

ENGINEERING

Typical Control Instruments

INSTRUMENTS measure thickness, shape, color, density, viscosity. Others study miniature chemical plants.

How They Were Developed



INVESTIGATION into the dynamics of pneumatic components produces data that manufacturers do not furnish.

How Centralized Control Works

Digested from CONTROL ENGINEERING, Sept, p63

Think of E. I. du Pont de Nemours & Co. and you think of chemicals. But here is a company technology that spawns almost as many machine-control innovations as it does pure process advances.

The fact is that after passing through a strictly chemical phase, many of the company's myriad products must undergo elaborate mechanical processing. And machine operations, like their chemical counterparts, must be precise to insure quality and yet minimize cost. This unusual blending of processing and fabrication with common control objectives has led to the formation of a unique and fruitful central control force and to systematized handling of control problems throughout the entire company.

Each plant has its own instrument department, and many of the larger ones have full-scale control development groups. Three divisions of the engineering department include groups whose concern with instrumentation and control makes them an aid to all plants. They are design, engineering service, development engineering.

The design group selects instrumentation for new plants and designs their installation. It looks to the development engineering group for long-range control engineering development that will improve yields, lower costs, and handle new processes that operate at high reaction rates and sometimes at high pressure and temperature.

The engineering service team consults with existing plants on product quality measurements, systems analysis, and instrument maintenance. The group also assist in new plant startup and semi-works engineering. Dynamic analysis is an effective tool in its activities. As "trouble-shooters," group members must have available the best measurement and control technologies. Development engineering provides the necessary laboratory facilities and techniques.

Two laboratories, engineering research and mechanical development, make up the development engineering division. Their job is to pinpoint the fundamental problems common to many plants. The balance of the laboratories' projects are largely applications of results of research and development to specific plant problems. Most of these projects are initiated by the laboratories' staff, while the rest are taken from outside groups whose specifications cannot be met with presently available commercial instruments or controls.

New

A 25% boost in speed of U. S. military aircraft is possible with a revolutionary concept in supersonic aircraft design. Known as the area rule, it was developed at the National Advisory Committee for Aeronautics' Langley Laboratory.

Briefly, what the rule does is this: it reduces the once-complicated procedure for determining minimum aircraft drag configuration to a simple graphical procedure.

Several new fighters have confirmed the area rule. The fighters have their fuselages indented slightly at the wing root for better performance.

Digested from AVIATION WEEK, Sept 12, p12

As Car Compression Ratios Keep Climbing . . .

Oil Industry Sees New Fuels Ahead

Digested from PETROLEUM WEEK, Aug 19, p9; Aug 26, p18

Some major changes in 1956 model automobiles are changes that will have quick impact on some segments of the oil industry, long-range effect on all. There are the usual changes in styling aimed at influencing consumer buying, but real changes in engines will mean more to oil men.

Engine compression ratios climb to new highs—boosting power by about 25 horsepower per car. More than 60% of 1956 cars have compression ratios between 8:1 and 9:1. Last year, only 18.5% fell in that bracket.

About 40% of all 1956 cars will require premium grade fuel. The need for higher grade fuel—and more of it—probably will force refiners to push premium grade gasoline up to an average of 97 to 98 octane before 1956 ends. By comparison, average octane rating of premium gasoline in July was 95.4.

Producers thus can expect higher crude demand in relation to total gasoline output. As octane rating goes up, gasoline yields go down. More barrels of crude will be required to meet the demand for greater volume of higher octane gasoline.

Refiners are in a real quandary as they plan for the future. The next few years will see higher octanes, but there is a good chance that engines of the years right after that will not require high octane at all.

There is much talk and some action in the automobile industry concerning radically different engines. These include gas turbines to power passenger cars and the potential adaptation of a diesel-engine-combustion chamber design to gasoline engines.

Whether or not the future developments of automobile manufacturers will mean an outbreak of radically different refinery processes is anybody's guess. Industry officials say, however, that new processes—or at least improvements on existing processes—will have to be developed to make the needed higher-octane motor fuel.

Refining processes now being used, such as catalytic cracking and reforming, give the industry a big jump toward meeting the expected changing fuel requirements. Gasoline yields can be reduced in favor of higher cuts of distillates for new-type engines.

But the upward movement in octane requirements is the more immediate concern to refiners. Meanwhile, refiners must always keep in mind the possible change to engines burning lower-grade fuels. This will not halt any refinery expansion or new construction programs, but it is bound to lend a note of caution in future planning.

The most likely changes in engine design that would alter fuel requirements are:

- Development of a gas-turbine engine for passenger cars.
- Adaptation of a new diesel-engine combustion-chamber design for gasoline and all diesel engines.

The gas-turbine engine has been tested by Chrysler and General Motors. Turbine-powered cars may be on the road by 1960.

The big change to using lower-grade fuels in auto engines may come with the development of a multi-fuel engine. The design features of a diesel engine developed by the German firm, Maschinenfabrik Augsburg-Nurnberg, appeal to automobile makers. This engine, called the MAN diesel, operates on most any fuel—high- or low-octane gasoline, jet fuel, high- or low-sulfur diesel fuels, SAE 10 motor oil, or any mixture of these fuels.

METALLURGY TECHNICIANS at GE work with giant "laboratory" equipment

A Close Look at Metals

Digested from BUSINESS WEEK, Aug 27, p154

At Schenectady, New York, the General Electric Co. has added a $5-million laboratory to its extensive research facilities. The new building is devoted to metallurgical and ceramic research—fields in which GE is becoming more and more deeply involved.

The new laboratory—unlike 38 others maintained by GE—is not a place for paper-and-pencil or test-tube operations. Rather, it is a pilot plant where just about any known metal or ceramic material may be manufactured in sizable quantities by means of all the latest processes. Laboratory "samples" will be developed and tested until it is possible to interest a basic-metal producing company in the idea of undertaking regular commercial production.

GE is not the only electrical concern taking great interest in metallurgical research. Late this year, Westinghouse Electric Co. is opening a somewhat similar facility at Blairsville, Pa. Bell Laboratories, another electrical company (in the telephone industry), is also highly active in the field.

Basic research in metallurgy has interested the large electrical companies—more than the large metal producing companies—for several reasons: (1) The electrical industry has acquired a reputation for research. A few of the bigger concerns are widely known as academic-minded institutions. (2) Government contracts—covering advanced military projects—have been won by the big electrical concerns because of their leading position in metallurgy. (3) The industry long ago discovered that metal technology was retarded and would, in turn, retard the development of electrical products unless a program of research was carried out.

Lightness in weight, close tolerances, durability, high temperatures, electrical conductivity, magnetic steel, tungsten filaments—these are some of the special problems involving metallurgy that confront the electrical industry in much of its work.

A "new" approach to the science of metallurgy is being pursued by research men at GE, Westinghouse, and Bell. The "new" metallurgist is not particularly interested in improving the processes that made the metal industry a production giant. Rather he is concerned with basic questions and answers.

What is metal? What is corrosion? What is metal fatigue? What are the physical and chemical reactions involved in alloying? The "new" metallurgist measures in microns—not in tons. He is concerned with the broad field of crystalline solids—metals and ceramics—rather than any one individual metal. He talks of an impurity of one part in billions, and of dislocations in sub-microscopic structures.

"New" metallurgists at Westinghouse have produced pure and perfect slivers of iron that are at least ten times as strong as ordinary iron wire, three times as strong as steel piano wire. This is a fairly typical example of the hundreds of projects that have been carried out by researchers at GE, Westinghouse, Bell, and a few others.

Advanced metallurgy is making its biggest impression in the largely military-sponsored fields of high-speed flight, electronics, and nucleonics. When jet engines and atomic radiation came along, industry was faced for the first time with vital situations that called for superior properties in metals. The resulting research will doubtlessly apply to wide commercial operations as well.

"Accident" Destroys Test Nuclear Reactor

Digested from POWER, Sept, p81

Water-cooled experimental reactor, Borax I, was built in 1953 at National Reactor Testing Station, Idaho. Two-year series of tests showed that a properly designed reactor automatically shuts itself down when allowed to go out of control. Final experiment purposely destroyed the reactor, above.

Reactor stands inside partly buried open tank at center of earth mound. "Accident" was staged by spring-ejection of the central control rod out the bottom of the core. In 0.1 seconds, reactor power rose to over 10-million kilowatts with the rod 80% out of the core.

Melting fuel elements produced terrific flash generation of steam, bursting reactor tank and hurling control mechanism and core high into the air. Most fuel fragments fell within 200 feet of the reactor. There was no appreciable radioactive fall-out a few hundred feet from the reactor.

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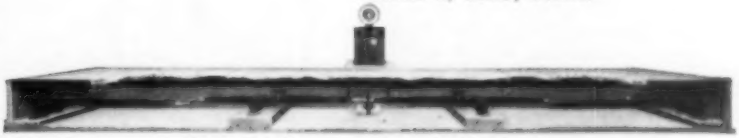

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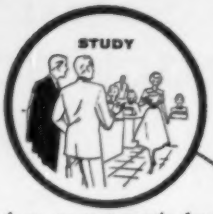

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Microbes and Oil

Digested from PETROLEUM WEEK, Aug 19, p22

Tiny microscopic organisms that thrive on petroleum hydrocarbons are the subject of several new research projects that could have far-reaching effects in the oil industry.

Magnolia Petroleum Co. and others are working on these ideas. All involve the use of microbes: (1) a way to eliminate stream pollution by getting microbes to remove the "last trace" of oil from refinery waste water; (2) a way to have microbes detect oil deposits—by their reacting to gases that seep to the surface; (3) a type of microbe that will attack the bacteria that cause corrosion of oil-well equipment; (4) using microbes to perform oil refining processes, by means of fermentation, and thus saving use of chemical processes.

Man-Made Fur

A new fur-like fabric, developed by chemical research this year, has created a mild sensation in the women's clothing trade. The "pile" fabric is made by combining two materials —"Dynel," perfected by Union Carbide and Carbon Corp., and "Orlon," made by Du Pont. The soft and smooth man-made fur has begun to compete seriously with natural fur. Retail sales volume will be somewhere near $50-million by the end of 1955. The fabric very closely resembles sheared beaver or mouton. It dries fast after washing, does not attract moths, is much lighter and less bulky than real fur, and wears well.

Digested from BUSINESS WEEK, Sept 10, p58

U. S. Antitrust Laws . . . Restrict Business Abroad

Digested from BUSINESS WEEK, Sept 17, p125

The impact of United States antitrust laws on business abroad —especially the Sherman Act, intended to prevent monopolies—has ceased to be an academic question for the law journals. It is now a controversial, practical issue.

U. S. businessmen have been complaining more and more loudly that the Sherman Act hampers their overseas operations—and lately the businessmen have been having their complaints heard in official quarters. The Senate Antitrust and Monopoly Subcommittee, headed by Sen. H. M. Kilgore, recently held public hearings on the subject. Studies in Europe were recommended and are being carried out.

The Subcommittee will eventually attempt to develop legislative recommendations for revising any sections of the law that may be working a genuine hardship on overseas business.

The problem was reviewed recently by the U. S. Commerce Department. Findings showed that antitrust situations arise primarily in connection with the investment of U. S. technical knowledge abroad —licensing arrangements, minority stock purchases in foreign companies, and so on. The trouble begins for the U. S. businessman — antitrust trouble, that is — when he seeks to export his technological experience at a profit.

For example, suppose a small U. S. manufacturer of a new type of television tube wants to enter the Italian market. He finds that dollar shortages, import barriers, and similar obstacles prohibit his selling profitably in Italy on an export basis. He considers building a factory in Italy, but the expense is much too great.

At that point he is approached by an Italian electronic equipment company that wants to manufacture and market the tube under a license arrangement. If the U. S. manufacturer extends the license, without restrictions, he faces possible competition from the Italian company in the U. S. and, perhaps, in other markets outside of Italy.

But if the American enters into an agreement with the Italian concern, restricting sales to Italy, he is liable for prosecution under the Sherman Act—on grounds of conspiracy to restrict competition in the foreign commerce of the U. S.

He runs an additional risk of prosecution under the antitrust laws if he makes a direct stock investment in the Italian company—either because it needs the capital or because he wants to control the quality of his product or the policies of the Italian company. Investing in the stock of a potential competitor in itself may be judged a violation of the antitrust laws.

Businessmen — and some U. S. officials who want the law liberalized—argue that, in a case like the above, any real benefits to the Italian economy or to the American investor are lost because of a misconception of the phrase "free competition." They maintain further that, not only is the law poorly administered, but it also is vague and quite difficult for the laymen to understand and obey—even with the help of lawyers.

General guides as to what the U. S. businessman *can* do and *cannot* do abroad—with reference to his country's laws in restraint of monopoly—may be expressed as follows:

1. Almost every agreement among potential competitors to share markets has been declared "unreasonable."

2. A purely "internal" price-fixing agreement in another country would not be illegal.

3. The fact that a given practice has been engaged in for a long time is no reason for the American businessman to expect immunity from prosecution.

4. Parent-subsidiary corporation agreements will not affect application of the law.

5. The volume of business involved does not matter.

6. The fact that the restrictive agreement is entered into outside the U. S. is no protection against eventual prosecution.

7. The fact that foreign governments may encourage restrictive agreements will not weigh heavily in U. S. courts.

The immediate future — especially since 1956 is an election year in the U. S.—will see little or no change in the substance or application of U. S. antitrust laws. Both U. S. and foreign businessmen will continue to have their dealings somewhat interfered with by vigorous antitrust enforcement. Those in the U. S. who strongly support this enforcement — and they are many—have a great fear of abusive monopolies and cartels. Neither their fears nor their arguments will be easily overcome.

In Latin American Oil: More Investment Needed

Digested from PETROLEUM WEEK, Sept 2, p27

An estimated capital investment of more than $400-million dollars a year for the next 10 years will be required to meet Latin America's demands for petroleum and its products. That was the forecast made recently by the United Nations Economic Commission for Latin America (ECLA).

The UN group estimates that domestic crude-oil requirements in Central and South America will triple during the next 10 years. Refinery capacity in Latin oil producing countries will have to be doubled by 1965 if projected requirements for petroleum products are to be met.

In Latin America as a whole, the portion of total energy needs filled by petroleum rose from 25% in 1937 to 50% in 1952. Per capita consumption of petroleum products rose 6% annually in the same period. The trend to oil and away from coal is expected to continue.

The steady increase in Latin American demand is resulting in an ever-increasing influx of overseas oil investment capital.

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U.S. investment overseas, a disappointment since World War II, has begun to respond to world prosperity and the freer international flow of money. At the end of 1954, total U.S. direct investment abroad—direct ownership of property and equipment—was about $17.5-billion.

By the end of '55, the figure will have jumped to around $18.5-billion. Portfolio investment at the end of '54—foreign stocks and bonds—was about $9-billion; it should reach $10.5-billion by the end of '55.

Outlook is generally favorable. Direct investment—in mines, oil, manufacturing—will continue to expand in the months ahead. The same applies to foreign dollar bonds; they should continue to find ready buyers in America.

Foreign stocks will sell, too, and in greater quantities, although recently U.S. buying has declined a bit. Canada still gets the biggest part of U.S. stock investment, but during the past year investors have been turning more and more to European and South American enterprises to find good returns on their money.

✦ ✦ ✦

The International Finance Corporation, an agency of the World Bank, is finally taking shape—after years of trouble getting organized (McG-H Digest, July '52, p19). IFC is designed to fill existing gaps in development financing—gaps that somehow remain in spite of both public and private lending institutions.

IFC will make (non-voting) stock investments in overseas ventures and then sell its own securities (bonds) to private investors. Legal requirements, including ratification by the governments concerned, will be cleared up by the end of '55. Lending operations should start early in '56.

At least 30 nations will be enrolled as original members of IFC, according to World Bank officials. Initial capital, to be contributed by member nations, is set at $100-million. The U.S., Britain, and Canada will have contributed their shares by the end of this year.

✦ ✦ ✦

Peruvian market will improve gradually—such is the opinion of 326 exporters and manufacturers in the U.S. who were surveyed recently by the Foreign Credit Interchange Bureau. The businessmen reported that their credit and payment experience in Peru during 1955 had been "excellent." The forecast: a slow but steady expansion of business.

✦ ✦ ✦

The Government of India is reported to have agreed with the U. S. to a private-investment guarantee. Under the plan, India would guarantee, for 25 years, against nationalization of any U.S. investment in India and would safeguard investors against non-convertibility of exchange.

Financial Digest, compiled from various sources, analyzes current financial trends and underlying factors.

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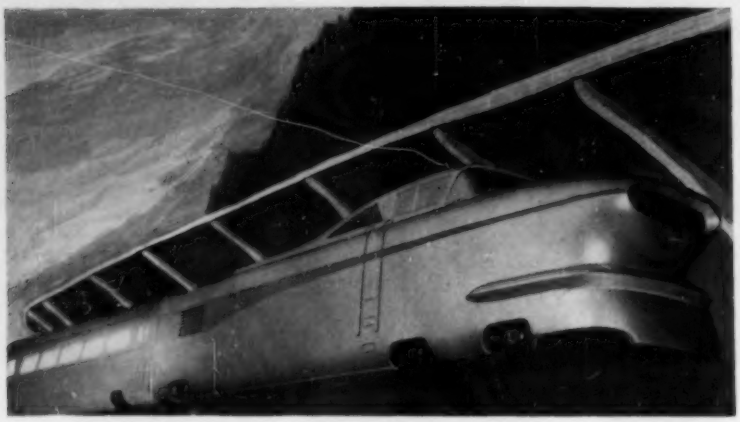

More Train per Dollar

Digested from RAILWAY AGE, July 4, p8; Sept 5, p38

A low-slung, lightweight passenger train—called Aerotrain—has been produced by General Motors Corp. The streamliner emphasizes speed and economy. Aerotrain was a featured exhibit at the recent GM "Powerama" show in Chicago.

Harlow Curtice, president of GM, has said that Aerotrain was designed and built "at the request of railroad officials."

Railroad men are enthused—and for good reason. The new train carries 400 passengers at speeds over 100 miles per hour. Two of the 40-passenger cars are equivalent in seating space to one 80-passenger conventional coach, but they weigh only 30 tons instead of 65. Design is patterned after GM's "Scenicruiser" (two-level) buses, put on the highways in 1954.

An example of modern bus design, incorporated in the new train, is the baggage compartment—located beneath the floor. This improves appearances and contributes to a higher ride for the passengers.

The cost is even more attractive to railroad men than the train's high degree of efficiency and jet-like appearance.

Curtice has said that if it goes into volume production, the train would sell for less than $1,000 per passenger seat. This cost is less than half that of standard coaches, which are now priced around $2,250 per seat. Car bodies are designed for low cost production; they can be replaced for less than it costs to rebuild present-day cars.

A new approach to train making—the use of mass-production methods—may result. That depends on how the railroads react.

Nelson Dezendorf, who heads the GM division that would build Aerotrain commercially, is looking for a policy decision to put GM in the train-making business. He says that mass-production techniques could be applied profitably. He points to the fact that the company was able to use its skill in mass-production methods when it set up its diesel-locomotive division.

"The trouble with the railroad-car business," says Dezendorf, "is that there is no standardization." Each railroad has its own ideas and its own set of specifications. He would try to persuade all railroads to buy one standard model.

Thus far, the Pennsylvania, New York Central, New Haven, and Santa Fe railroads have shown great interest. But neither General Motors officials nor railroad men have stated definite plans. Sum-up of opinion seems to be "favorably impressed—but wait until after trial runs are completed." Regular tests will be made on the Pennsylvania and New York Central, starting this month.

Volkswagen Rides a Boom

Digested from THE ECONOMIST (London) Aug 13, p523 & 568

Eleven hundred autos a day are rolling off assembly lines at Wolfsburg, West Germany—each one an economical and easy-to-handle Volkswagen. In 18 months, output will be up to 1,500 a day. The first million Volkswagen have taken the company more than 7 years to produce; the second million may take less than 3 years.

Volkswagen's distributor in the U. S. recently sounded the note of Volkswagen's international success when he said that the car represents ". . . a return to the idea that inaugurated American car production—one chassis, one engine, and simplicity. We are not selling chromium, we are selling wheels—in short, transportation. . . ."

Whatever the appeal, Volkswagen is a huge success in the U. S. The efficiency-designed car is now selling there more than all other foreign makes put together!

Though the Volkswagen is not the cheapest car in Germany, its makers are hoping—through production of one basically unchanged model year after year—to achieve successive reductions in price. The company apparently is recalling the experience of Henry Ford with his Model T, in the U. S.—and is thinking of its own inexpensive automobile as a kind of Model T of the Fifties for Europe. Production of one model, however, does not prevent addition of other models. A new one has just been announced.

Whether Volkswagen—and other German industries, as well—will be able to achieve lower prices, will depend largely on the available supply of labor and how much that supply will cost, per manhour. Scarcity of labor, and therefore the rate for labor, are becoming more and more of a problem for West German industry. Thus far, the factory at Wolfsburg remains unhampered by labor shortages.

For 1956: Safer Cars

Digested from BUSINESS WEEK, Sept 17, p67

For years, American automobile makers have concentrated on speed, smooth design, economy of operation, and riding comfort. Now they have added a new item to their list of selling points — greater safety. They have become accident-conscious, whereas a short time ago the word "accident" was an ugly term that respectable automobile men never uttered in public.

The Ford Motor Co.—second in size of the "Big Three" auto makers —has been leader of the new campaign to promote the idea of safety. Recently, Ford held a two-day "National Safety Forum" at its test track in Dearborn, Michigan. To climax the event, it staged a series of nerve-jarring wrecks of 1955 Fords. The cars had some new safety features built in—features that appear in 1956 models.

The idea was to show the public that Ford's '56 cars are "the safest the company has ever built." The current Ford sales campaign stresses the safety theme. "Lifeguard design" is their sales slogan.

Detroit has never seen such a solid line-up for safety. All companies are pushing the idea. All are offering safety seat belts for 1956—since emphasis is on coping with accidents and limiting damage and injury, rather than making a pretense of being able to prevent accidents.

General Motors, Ford, Chrysler, and Studebaker-Packard have developed safety-lock devices to prevent doors from springing open in a crash. Ford—somewhat ahead of the others in safety research—is offering (1) steering wheels that will collapse slowly if hit by the driver's body in a crash; (2) seat belts anchored to the car's structure; (3) crash cushioning above the instrument panel and on sun visors; (4) rear-view mirrors that have a plastic backing to reduce the danger of flying glass when the mirror is shattered.

Windows, of course, have long been made with double-pane, nonshattering glass.

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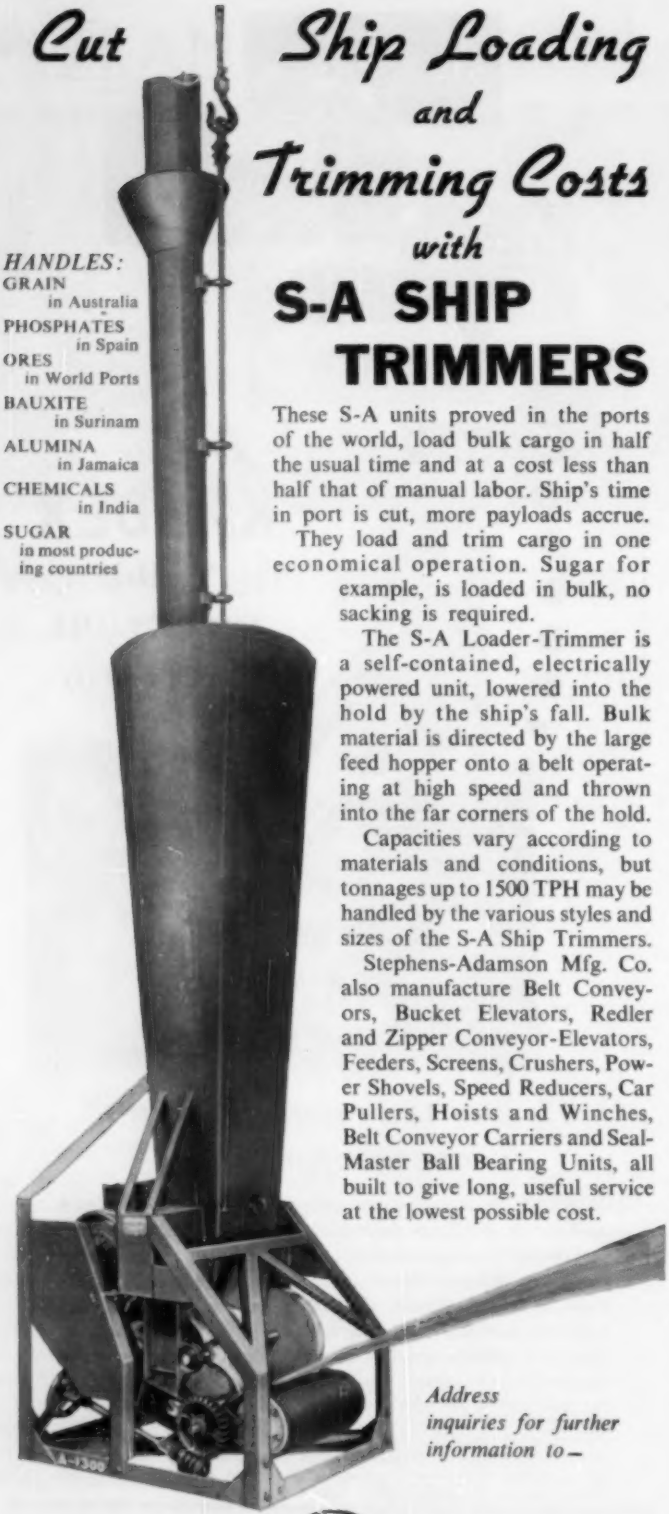

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Businessman's Airplane Supercharged for Speed

Digested from AVIATION WEEK, Sept 19, p105

The Aero Design & Eng'rg. Corp. hopes to lead the twin-engine business-plane field early next year with a new aircraft and a new engineering concept. The aircraft is the Super Aero Commander 680. The engineering concept seeks to narrow quickly the wide gap now existing in the comparative performance of business and airline planes.

The 680 is the fastest twin-engine airplane ever designed and produced exclusively for business use. Its top speed is 260 miles per hour and it will cruise at 230 miles per hour at 10,000 feet on 70% power. Fully loaded, it will maintain a single-engine ceiling of 15,000 feet.

Key to this performance is the pair of Lycoming GSO-480-AIA supercharged engines, each developing 340 horsepower on takeoff and 320 horsepower normal rated continuous. The engine is a geared-drive six-cylinder horizontally-opposed dry-sump air-cooled unit with side-mounted accessories. The supercharging feature materially improves engine performance because of a higher fuel to air mixture, resulting in a higher degree of power distribution between cylinders.

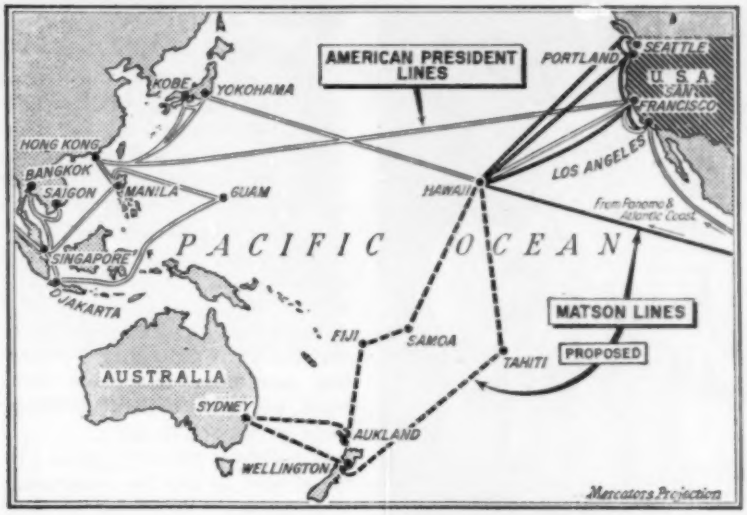
Other specifications: gross weight is 7,000 pounds and disposable load is 2,750 pounds. Normal range is 1,400 miles. Ceiling is 26,000 feet.

New

World's largest rubber-tired vehicle will make the trails of the "frozen North" open highways. A power-control car will haul five cargo cars, 25-ton capacity each, over frozen trails in Alaska. Power-control car sleeps a crew of four. Diesel-electric sets in the power car supply electricity to 24 electric driving wheels.

Built by R. G. Le Tourneau, Inc., its total length is 274 feet; its giant tires are 88 inches in diameter. Operated by Alaska Freight Lines, it will reach normally isolated areas with supplies during the long winter months.

Digested from FLEET OWNER, Sept, p115



Competition Is Heavy . . .

Sailing the Blue Pacific

Digested from THE ECONOMIST (London), Aug 20, p622

From the viewpoint of shipping operators, the Pacific Ocean is now less of an "American lake" than it was before World War II—much less. American flag lines in the Pacific are barely keeping their heads above water, economically speaking.

Today, these lines are carrying under 25% of the passengers they had in the 1930s, and only about one-third the volume of freight.

Shipping troubles of American operators in the Pacific have arisen from several causes: (1) the crushing loss of the rich China trade; (2) an impressively swift return of foreign competition after 1945 —mostly Japanese and Scandinavian; (3) a lengthy rate-cutting battle with foreign lines; and (4) a sharp rise in air traffic.

In addition, U. S. operators in the Pacific are burdened by the ever-increasing cost of operating and replacing ships and by the absence of a consistent program of government assistance.

Subsidies for ship construction were approved by Congress at its recent session, and about half of this benefit will go to the two largest American carriers in the Pacific —American President Lines and Matson Navigation Company. But, in spite of government aid, American President and Matson have only limited plans for future expansion.

American President has had its greatest troubles with passenger operations. In the 1930s it operated seven trans-Pacific liners with large passenger accommodations. Now it has only two, and these operate considerably below capacity. Modest plans call for reconverting four existing freighters to passenger service, and for two new cargo ships with room for 106 passengers each.

Matson Navigation, before World War II, used two 770-passenger luxury liners for its service to Australia and New Zealand. In 1956, Matson intends to "re-establish" this service with two freighters converted to carry 370 passengers each. Despite this modest program, Matson insists that guarantees from the government and maritime trade unions are needed.

It is perhaps significant that Matson, organized as an ocean transport company, has recently steered 20% of its assets out of the open sea and into the operation of hotels, an insurance company, and investments in industrial stocks.

British Shipbuilders Make Steady Progress

Digested from METALWORKING PRODUCTION, Aug 26, p1492

New designs and new production methods—including prefabrication—are marking steady progress and expansion among British shipbuilders these days. United Kingdom yards have been shaping up to cope with increasing competition, chiefly from Germany and Japan.

On the engineering side, a wide variety of reciprocating engines is in production for use in the different classes of vessels and boats being produced. One notable development is a small multi-cylinder engine, light in weight, for merchant ships. The idea is that multi-engine installations—using units of this type—would take up less space aboard ship and require less maintenance. The gas turbine, for marine use, is still experimental.

Prefabrication has added to production efficiency. Pre-welded units are assembled in the shop, moved out to the yard, and then hoisted into place on the hull. Speed and economy are achieved, though new equipment expense runs high.

▶ New

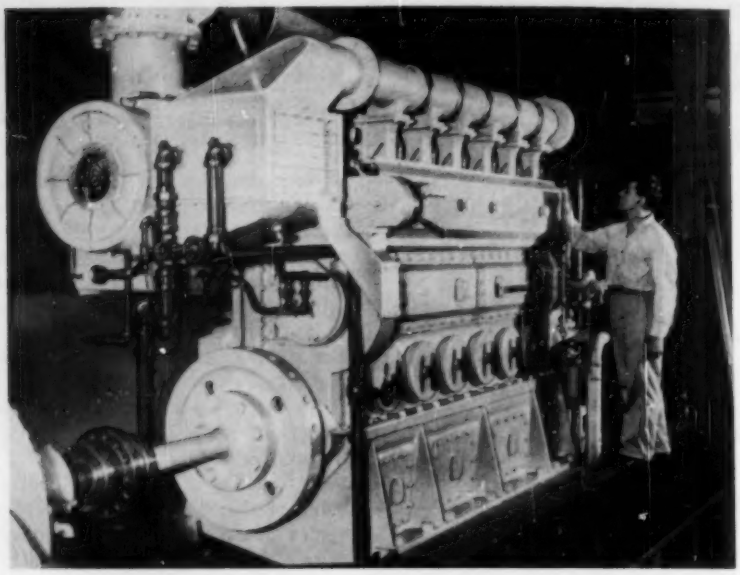
Operators of the world's tanker fleets have suddenly begun an almost frenzied search for new ships —after 2 years of lagging purchases. They see tremendous ocean-voyage business for the petroleum industry in the years ahead—and abruptly decided to do something about it.

The downward trend of tanker purchase reversed itself in August. Worldwide construction orders in the first 15 days of August amounted to 25% of the total tonnage of all tanker orders placed in the first 7 months of the year. The purchase boom has continued.

Japanese shipyards are getting the biggest orders; U. S. shipyards, the smallest.

Digested from PETROLEUM WEEK, Sept 2, p9

NEW PRODUCTS



Medium-Speed Diesel Engine Offers Heavy-Duty Continuous Service

Medium-speed diesel engine, rated at 400 to 1,400 horsepower, has been designed for service in utility and water works, sewage disposal plants, irrigation, chemical and petroleum, marine drives, mining, radio and radar station, pump or blower drive and mobile-power application.

It is particularly adaptable for marine applications since it may be easily equipped with a reversing gear for propulsion service. The engine is also suitable for shipboard auxiliary service since the welded steel construction makes the engine a compact unit with a low weight per horsepower.

The new W9 engine has a 9-inch bore and an 11-inch stroke, and is built for speeds up to 1,000 revolutions per minute. It is designed throughout for turbocharging. The W9 can be equipped with any of the standard clutches, hydraulic couplings, torque converters, or other power take-off equipment.

For operating efficiency and economy, the engine is capable of using the lowest-cost fuels available. The W9 can operate on residual, crude and distillate oils, natural gas, sewage gas, manufactured gas, or propane.

Jet Swirl action accounts for the low fuel consumption and high power output obtained with this engine. The intake passages are designed to impart a turbulent swirling motion to the air as it enters the cylinder, assuring intimate rapid mixing of the air and fuel before entering the combustion space.

The crankshaft of the W9 is suspended from the frame, carried in cast-steel bearing shells. This type of construction leaves the actual engine base as a unit for supporting the engine and for mounting it on the foundation. Since the base, of welded steel construction, does not transmit any running-gear stresses, it is a simple matter to fit the base and engine to a foundation or mounting. The base serves as the oil sump for stationary applications.

The main engine frame is also of welded steel construction, fitted with cast-iron cylinder liners. Water jackets are cast integral with the liner. As jacket water does not come into contact with the steel frame, there is no danger of corrosion or leakage of water into the crankcase. **(Worthington Corp., Harrison, N. J.)**

Modern Press Designs

Four new presses reflect industry's trend toward automated production and the need for decreased maintenance despite growing complexity of press operations.

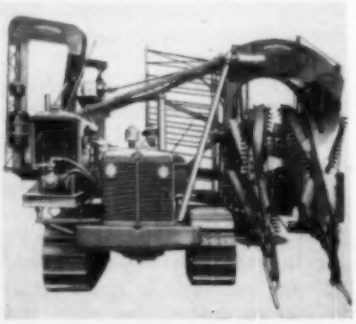
The 75-ton model OBI is a modern, streamlined series complete with new air clutch. A motorized inclining adjustment permits an inclination of up to 20 degrees without a pit.

The 400-ton knuckle joint press was designed especially for coining, extruding, sizing, and other work needing powerful pressure close to bottom stroke.

The 250-ton two-point press will be utilized to aid the automotive and appliance industries in their swing to the automated plant. It is completely "packaged," ready for installation.

The High Production Press is capable of speeds in excess of 450 strokes per minute. All controls have been removed from the press and are mounted on a separate pedestal. **(E. W. Bliss Co., 1420 Hastings St., Toledo 7, Ohio.)**

●



Crawler-Mounted Harvester

The new Hurrycane Harvester is designed for mounting on the standard Allis-Chalmers HD-9 crawler tractor. Operated with the Hurrycane Loader, it completely mechanizes sugar-cane harvesting.

The harvester cuts and tops the cane and elevates it into a heap row. Outboard mounting of the cutting unit permits the machine to handle uneven row widths, from 4 feet up. **(Thomson Machinery Co., P. O. Box 71, Thibodaux, La.)**

Versatile Grinder

This new machine makes it possible to grind a wide range of jobs at lowest cost. The 12-inch type U-4 universal grinding machine simplifies set-ups. Its fast, precise action reduces actual grinding. It also permits rapid changes to external or internal grinding.

The turning of a conveniently positioned dial sets work speeds in a range from 40 to 400 revolutions per minute from an alternating-current power supply. Maintenance is facilitated by the easy accessibility of controls and parts requiring service. **(Norton Co., Worcester 6, Mass.)**

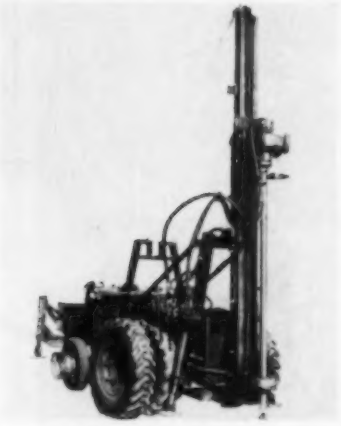
●

Four-Wheel-Drive Truck

This four-wheel-drive, light-duty truck has power and traction to travel cross-country fully loaded in mud, sand, or snow. The R-120 (4x4) has a gross vehicle weight rating of 7,000 pounds and is offered in four wheelbases between 115 and 134 inches.

In proving ground tests, the new truck, fully loaded, climbed a 56% grade easily. The truck can be operated on hard-surface roads as a conventional rear-wheel-drive truck; the front-axle drive can be engaged quickly and easily by a shift lever. **(International Harvester Export Co., 180 N. Michigan Ave., Chicago 1, Ill.)**

●



Portable Drilling Rig

A new kind of portable drilling rig brings to rock drillers all the advantages of rotary rock drilling with compressed air—clean, fast holes, fast setup, and longer bit life. The Rotadrill on Pneumatractor is a complete, self-contained unit, self-propelled and self-powered, and can drill a 4½-inch hole to a depth of 500 feet.

One-man operation is possible because all controls are arranged in one bank, adjacent to the mast. The heavy welded structural steel mast, lowered for traveling between jobs, can be operated at various angles for sloping holes. **(Schramm, Inc., 900 E. Virginia Ave., West Chester, Pa.)**

●

Diesel-Electric Generators

Self-regulated generator sets meet the needs of applications now served by self-regulated or externally-regulated generators. The diesel-electric sets feature close voltage regulation. They provide steady voltage from no load to full load.

The generator sets are easily installed. During initial installation, the "terminal" voltage and voltage "drop" can be adjusted to meet the special needs of the particular application. After installation, the adjustments are locked and no further adjustments are necessary. **(Caterpillar Tractor Co., Peoria 8, Ill.)**

Handles In-Plant Bulk Materials

A 15-cubic-foot-capacity tractor shovel for in-plant handling of bulk materials features a power-shift transmission, a torque converter with 3:1 torque multiplication, a planetary wheel axle, and low-level bucket action. Designated Michigan 12B, the machine also features dust protective features. A filter is provided for the torque-converter oil and the power-shift transmission oil, while a partial-flow filter protects engine lubricating oil. Transmission, torque converter, starting motor, distributor, and generator are all sealed. The tractor shovel was designed to facilitate movement into and out of boxcars and along narrow aisles. (Clark Equipment Co., Battle Creek, Mich.)

Not everybody knows how to pack for export

There's a firm in the dock area at Newport News, Virginia, that does nothing but pack goods for export. They do it for some of America's biggest exporters – better and cheaper than the shipper could do it himself. They know how to guard against the hazards of climate and handling, and what's more the shipper doesn't pay inland freight on the crating. This is just one more of the extra facilities and services available and one more reason for instructing your American supplier to ship through Newport News.

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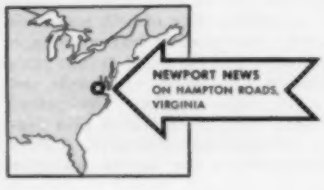
New York 7, N. Y.....233 Broadway
Stockholm, Sweden.....Kungsgatan 7



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NEW PRODUCT BRIEFS

"Power Shop"—Model MBF multi-purpose homeshop woodworking machine is powered by a ¾-horsepower direct-drive motor. Basically a specialized circular saw, the unit quickly converts for other home and shop woodworking jobs. **(American Machine & Foundry Co., 261 Madison Ave., New York, N. Y.)**

●

Mobile-radio Base—Type MCA-351-A Base Station is completely self-contained and multi-channeled. It provides transmission, reception, and termination facilities. The unit has accommodations for two receivers for simultaneous dual-frequency reception. **(Allen B. DuMont Laboratories, Inc., 750 Bloomfield Ave., Clifton, N. J.)**

●

Detects Leaks—A mass spectrometer leak detector detects a leak rate of $5x10^{-10}$ standard cubic centimeters of air per second entering an evacuated system under atmospheric pressure. It can be used selectively to locate a specific leak in the presence of other leaks, without loss of sensitivity. **(Int'l. General Electric Co., 570 Lexington Ave., New York 22, N. Y.)**

●

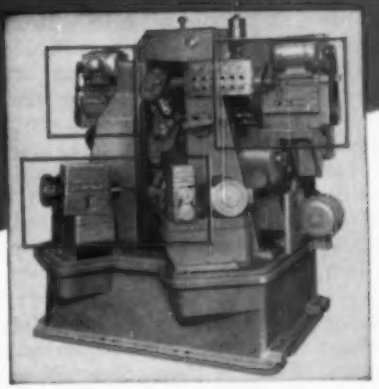
New Motor — Motor features a face-type registered bracket and special shaft, suitable for close-coupled centrifugal-pump applications. Pump may be mounted flush with motor by bolting to face bracket, insuring accurate alignment of pump and motor. **(U. S. Electrical Motors Inc., Terminal Annex, Los Angeles 54, Calif.)**

●

Anti-freeze Analyzer—Zerex anti-freeze analyzer shows which anti-freeze solutions are safe to hold over for another season and which have become corrosive. The test can be made in 2 or 3 minutes by maintenance men following printed instructions. The analyzer works only with Zerex anti-freeze. **(E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.)**

For High-Production Machines use....

Ex-Cell-O Quill-Type Hydraulic Power Units



This special machine with automatic indexing fixture core-drills piston pin holes and drills angular oil holes. It uses six Ex-Cell-O Power Units (shown without belt guards) operated from a central push-button station.

Ex-Cell-O Power Units feed and rotate tools in easily controlled automatic cycles. A single tool can be held in the unit spindle or a multiple head can be bolted to the quill flange. The Units are used in low-cost, high-production machines for such operations as drilling, reaming, counterboring and spot-facing. A typical machine consists essentially of a plain base, a work-holding fixture and one or more power units.

Ex-Cell-O Units are self-contained and compact; can be mounted horizontally, vertically with the spindle nose down, or at any angle between these positions. For details about these units write, or cable Ex-Cell-O in Detroit.

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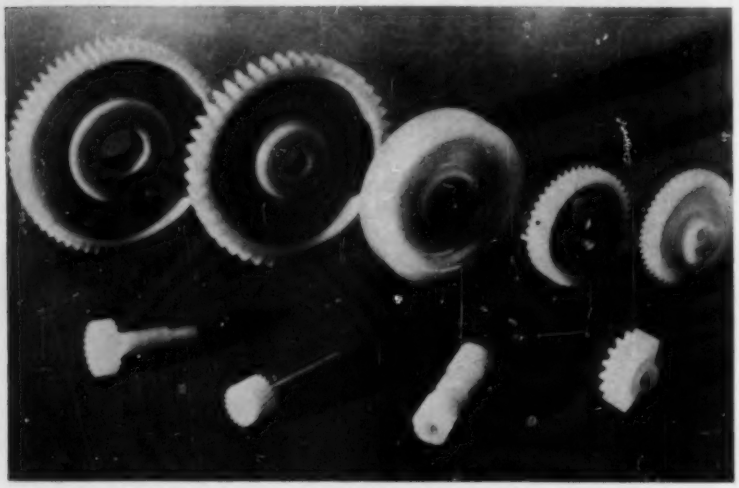
NEW COMPONENTS



Nylon Extrudes and Molds Easily, Solves Most of Molder's Problems

Below some temperatures, nylons are too solid to extrude or injection mold. Above the lowest workable temperature they rapidly become fluid; containment is then a problem.

A recently introduced nylon has a relatively high molten viscosity. This nylon is particularly adapted to blow-molding, a feat generally considered to be impractical from a commercial viewpoint.

In molding this new compound at low mold temperatures, maximum impact strength or toughness is obtained with minimum mold shrinkage. As mold temperature increases, the caprolactum nylon becomes more rigid, but even at 200°F. mold temperature it is not brittle. This characteristic of controllable crystalline structure is expected to permit the molder or extruder to vary the finished product's final physical properties in thin sections.

The new nylon does not decompose or liberate gas during the molding or extrusion cycle. So thick sections or large pieces can be molded with a minimum of voids caused by trapped air or gases.

This plastic compound can be cold-colored after molding, a technique that will appeal to those who want to make many colors in short runs and who will be satisfied with a few millimeters of color depth. Molding of fully colored pieces requires the usual blending of color with the change before molding. For very deep colors, a master batch and a blending operation can be used.

Parts molded in natural color are opaque white. Easy recovery without development of color is expected to permit close to 100% yield on every pound of this new compound. **(Allied Chemical & Dye Corp., 40 Rector Street, New York, N. Y.)**

●

Belt Takeup

Significant design advancements have been incorporated in Link Belt's DS takeup. A one-piece hinged top frame permits easy access to the bearing block and adjusting screw. A new arch-frame design adds strength to the end bracket, and the improved DS takeup is interchangeable with previous designs for use on a variety of materials handling equipment such as apron, belt, chain, drag, flight and slat conveyors, providing a positive yet easy means of adjustment. **(Link Belt Co., 233 Broadway, New York 7, N. Y.)**

Limitamp Motor Control

The new Limitamp high-voltage motor control saves more than 50% in floor space over previous models.

It's a high-voltage fused starter for coordinated control of motors up to 3,000 horsepower on 2,300- to 4,800-volt systems. It offers protection against circuit faults up to 60,000 amperes.

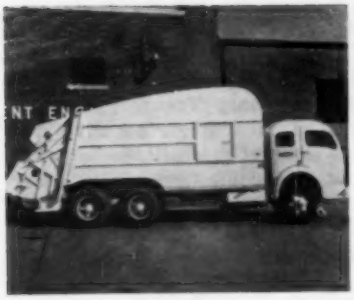
Designed to give maximum short-circuit protection, fuses of high interrupting capacity limit current flowing in a fault within one quarter of a cycle and interrupt within one-half cycle. **(International General Electric Co., 570 Lexington Ave., New York 22, N. Y.)**

●

Automobile Heating System

The 'South Wind" automobile heating system, which is completely independent of the car's engine or coolant, delivers fresh, heated air from outside almost instantly after it is turned on. It is completely automatic in maintaining a preselected temperature in the car without attention from the driver, regardless of speed or outside temperatures. The new system will be available as optional equipment.

The "South Wind" utilizes the heat distribution system built into cars by manufacturers. Located under the hood, the heating system has its own fuel pump and combustion-air supply as well as continuous spark ignition. Thus it is in no way dependent on engine operation. **(Stewart-Warner Corp., 1926 Diversey Pkwy., Chicago 14, Ill.)**



Compacting Refuse Bodies

Load-Packers, a new line of refuse collection and compacting truck bodies, feature the ability to compact and store any load that will fit into the hopper. The new tailgate design, coupled with improved and stronger tailgate hinges, makes the unit useful for dumping in rough areas.

Gate closing and compacting controls are now fully automatic. No safety features have been sacrificed in speeding up the operation. **(Gar Wood Industries, Inc., Wayne, Mich.)**

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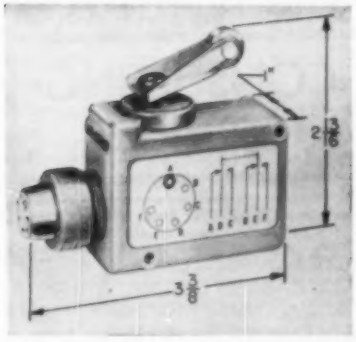

Limit Switches

A new line of completely sealed, environment-proof limit switches, Series "EP," has been developed for use in aircraft, mobile, marine and other industrial applications where conditions are severe.

The new switches contain an inert gas that prevents their operations from being affected by atmospheric changes. They are lightweight, offer a variety of electrical rating and circuitry selections, and are available in either side- or bottom-mounting designs. **(Minneapolis-Honeywell Regulator Co., 2747 Fourth Ave. S., Minneapolis, Minn.)**

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Permanent type antifreeze that keeps your car's engine safe through all kinds of weather is dependent on ethylene glycol. Other Dow glycols help make resins for improved radio equipment—even help to keep your tobacco moist.

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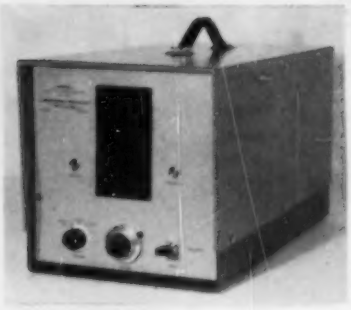

Digital Voltmeter

Sensitivity of the Type 33-110 SADIC Digital Voltmeter is such that 10 millivolts provide full-scale digital output (999). Controls permit selection of any voltage in either of two ranges (10 to 25 and 20 to 50 millivolts) for full-scale readout. Digital output appears on an illuminated panel for visual readings, and is also available through contact closures representing three decimal digits. Output may be used for operation of automatic typewriters, card and tape punches. Designed for bench-top use, the instrument requires 115-volt, 60 cycle alternating current. **(Consolidated Engrg. Corp., 300 N. Sierra Madre Villa, Pasadena 15, Calif.)**

●

Farm Tractor Improved

Allis-Chalmers has announced a fundamental engineering development in their model WD-45 wheel tractor and its implements. It is the extension of the principle of automatic weight transference to operation of heavier implements.

One of the outstanding features of the WD-45 is the Traction Boost system, by which the weight of rear-mounted implements is transferred to the rear wheels.

This new engineering development enables the tractor to utilize as much of the weight of plows, disk harrows, planters, and other rear-mounted implements, as needed to provide adequate drive-wheel traction, but without affecting the implement's depth of penetration. **(Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.)**

NEW COMPONENT BRIEFS

Multiple-copy Processing—Four or more sharp Transcopy photoprints from a single negative are now instantly available with a new chemical discovery called NR-555. **(Remington Rand Inc., 315 Fourth Ave., New York 10, Providence, R. I.)**

●

Flow Controller—The RCB-T tight-closing rate of flow controller, for effective operation of water, waste or industrial plants, has high control accuracy within 3% ranging from 25 to 100% of maximum capacity. **(Builders-Providence Inc., 345 Harris Ave., Providence, R. I.)**

●

Screw-driver Attachment — Damage to drills is unlikely when a Stanley H-180 screw driver attachment is used for driving wood screws. Attachment fits ¼-inch drills. **(The Stanley Works, New Britain, Conn.)**

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FREE LITERATURE

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. . . to the manufacturers for the free literature announced on this page. Tell them definitely which catalog you want—specify the catalog number or its name when either one is given. And mention that you saw the offer in MANAGEMENT DIGEST.

Polyethylene Waxes—Booklet describes in detail the typical properties, applications, and compatibility characteristics of Eastman's polyethylene waxes, Epolene "E" and "N."—Eastman Chemical Products Inc., 260 Madison Ave., New York, N. Y.

Mechanical Seal—The Mechanipak seal type BB-21A is specifically designed for use on rotary shafts at pressures up to 150 pounds per square inch. It is described and illustrated in bulletin AD-150.—The Garlock Packing Co., Palmyria, N. Y.

Personnel Materials—New Industrial Catalog will help you select better employees, improve employees performance, choose employees for promotion, and reduce employee turnover.—Science Research Associates, 57 W. Grand Ave., Chicago 10, Ill.

Dust Control—Type N Roto Clone is a high-efficiently, wet-type dust collector made in 15 sizes with capacity ratings from 750 to 50,000 cubic feet per minute. It is described in bulletin 277B.—American Air Filter Co. Inc., 215 Central Ave., Louisville 8, Ky.

Continuous Processing—Bulletin 7003 describes the distinguishing characteristics, capacities, and applications of Dorr-Oliver equipment available to the process industries.—Dorr-Oliver Inc., Barry Palace, Stamford, Conn.

Steel Tubing—The advantages, uses, and working data for SAE hydraulic-quality low-carbon-steel tubing is given in bulletin 39.—Superior Tube Co., 1528 Germantown Ave., Norristown, Pa.

Brine Production—Booklet entitled "Brine for Today's Industry" contains complete information on the Lixate process, a revolutionary system for making and handling better brine at lower costs.—International Salt Co., Scranton, Pa.

Sewer Pipe—Bulletin TR82-A contains the latest information on asbestos-cement pipe for connecting house drains with street sewers or septic tanks.—Johns-Manville International Corp., 22 E. 40th St., New York 16, N. Y.

Inventory Control—How inventory control can balance stocks and reduce costs for all manufacturing concerns is described in illustrated booklet KD-406.—Remington Rand Inc., 315 Fourth Ave., New York 10, N. Y.

Electric Blasting Caps—Technical bulletin covers in detail instantaneous caps, split-second delay caps and regular delay caps for the coal, quarrying and road-construction industries.—American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y.

Aggregate-producing Plant—Features, construction, performance, and operation of the Pioneer 405-W scrubbing, washing and sizing plant are described in bulletin 648.—Pioneer Engrg. Works Inc., 1515 Central Ave., Minneapolis 13, Minn.

Speed Changers—Operating advantages of "Vari-Pitch" speed changers, available in 12 sizes from 1 to 75 horsepower, with output speeds ranging up to 2,900 revolutions per minute, are described in bulletin 20B6013D.—Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Belt Conveyor—Complete information and specifications on the Stevedore Jr., a portable, power-driven, reversible belt conveyor for inclined or horizontal operation, are given in bulletin SJA-53.—The Rapids-Standard Co. Inc., Rapistan Bldg., Grand Rapids 2, Mich.

Compressors—Complete information on balanced opposed compressors, 3,000 to 10,000 horsepower, is given in bulletin L-679-B1.—Worthington Corp., Harrison, N. J.

V-Screen—Bulletin 243 contains complete information on the Symons V-Screen, specifically designed for fine screening, sizing, dewatering, cleaning and washing of sand, gravel, stone, coal, metallic and non-metallic minerals.—Nordberg Mfg. Co., Milwaukee 1, Wis.

Meters—The complete line of Propeloflo meters, a direct-reading, propeller-type instrument for metering water and other liquids, is described in bulletin 380-K4A.—Builders-Providence Inc., 345 Harris Ave., Providence, R. I.

Titanium—Progress Report No. 1 describes some of the developments and new uses for this metal.—E. I. du Pont de Nemours & Co. Inc., Wilmington 98, Del.

Grinding Machine—Bulletin G-640 contains complete information on the new Filmatic No. 0 centerless grinding machine for grinding a wide range of metallic or non-metallic parts up to ½ inch in diameter.—Cincinnati Grinders Inc., Cincinnati 9, Ohio.

Refrigeration Valves—Condensed Refrigeration Valve Catalog contains charts, selection data, and capacity tables on standard valves, filters and driers to fit any refrigeration need.—A-P Controls Corp., 2450 No. 32nd St., Milwaukee, Wis.

Bulk Handling Equipment—Performance characteristics, construction details, and engineering specifications of the new Ross Straddle dump carrier are given in bulletin 81-S-SD.—Clark Equipment Co., Benton Harbor, Mich.

Spot Welder—Complete information on the PMCO 2 ST air-operated, press-type spot welder is given in bulletin 334-3.—Sciaky Bros. Inc., 4915 W. 67th St., Chicago 38, Ill.

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Business Education World
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Chemical Engineering
Chemical Week
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Petroleum Week
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Product Engineering
Textile World
The American Automobile (Overseas Edition)
Today's Secretary

American Bankers Association
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Banking

American Management Association
330 W. 42nd St., New York 36, N. Y.
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The Economist Newspaper, Ltd.,
22 Ryder St., London S.W. 1, England
The Economist (London)

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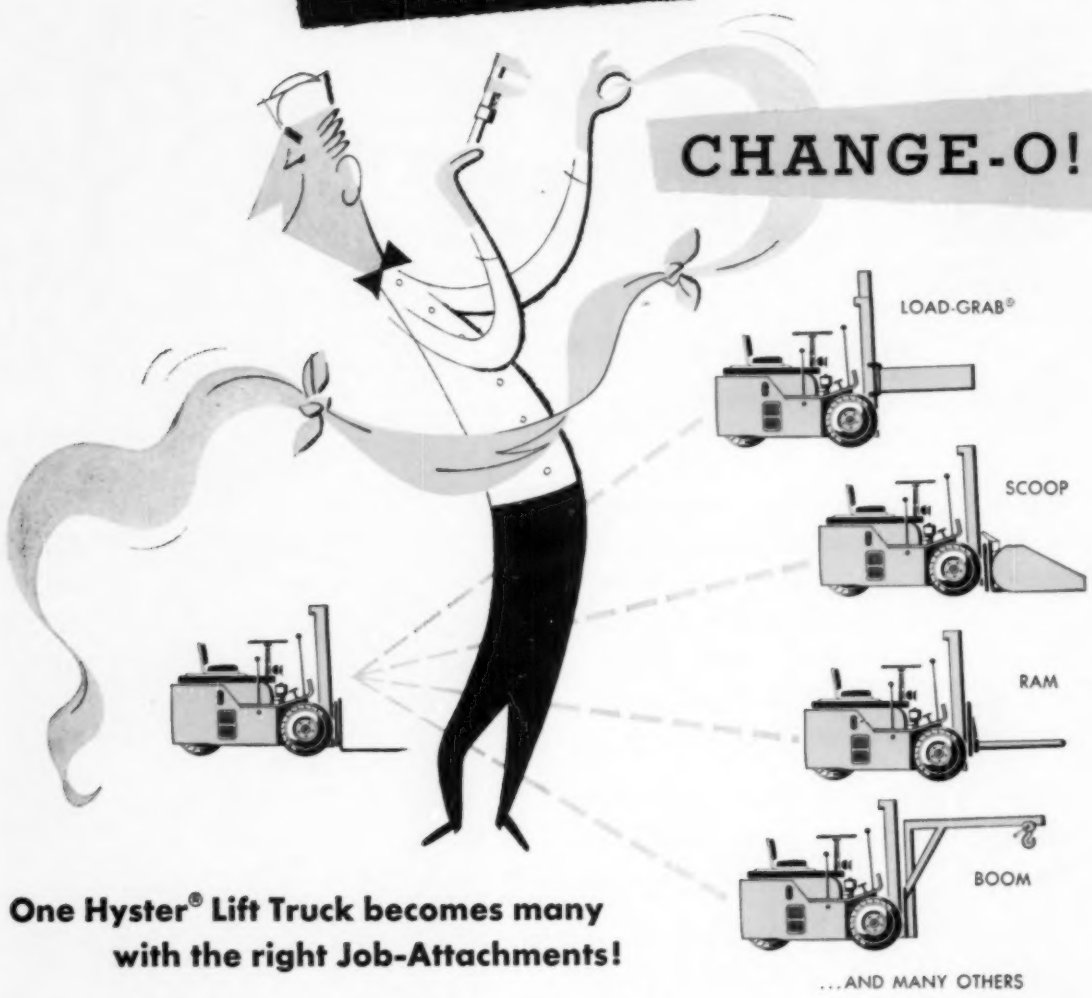

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